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# SIMULATION FOR CRISIS MANAGEMENT

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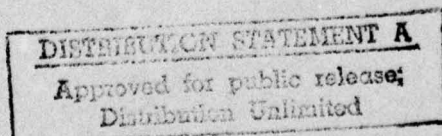
by

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**20. Abstract (Continued)**

→ other than direct measures of time are emphasized. Effective simulations maximize information yield for a given level of effort. This is accomplished by planning and conducting simulations individually and in related sets. ↗

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Robert L. Blanton

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## **SIMULATION FOR CRISIS MANAGEMENT**

### **Executive Summary**

**This report presents the results of the third in a series of studies designed to explore applications of social science research concepts, methods and techniques to the operations of the U.S. foreign policy Crisis Action System (CAS). This and other crisis-oriented studies by ARPA stem from a recognized need to better understand the behaviors of human decision-makers in the stressful, time-sensitive environments that characterize international crises; hence, the need to develop guides and practices and to configure systems that stand to best use man's talents, while minimizing possibilities for misunderstandings and error. This study develops the role of simulation as a tool to evaluate design elements, rules and procedures of the CAS. Emphasis is on development of valid criteria *other than* direct measures of time for use in simulation.**

### **Crises; The System**

A *crisis* is a situation external to the U.S., which develops rapidly and creates conditions of such diplomatic, political, or military importance to the U.S. government that commitment of military forces is contemplated. Crisis creating events may suddenly occur in areas of the world which have been relatively stable and trouble-free, or they may arise from recognized areas of intense and continuing national and international interests, animosities, and rivalry. Wherever they occur, crises require timely, flexible, controlled responses by the U.S. government to external events that are deemed to be serious threats to our interests and objectives.

To respond effectively, a CAS which operates outside the routine procedures used for normal day-to-day coordination and management of political, military and economic programs and policies, has evolved within the U.S. government. The CAS includes a number

of elements, some established by law and others by presidential choice, that provide the structure for coping with crises. The specific configuration of the CAS for a given crisis situation depends largely upon the source and nature of the threat, the location of the crisis situation and the response options chosen by the National Command Authority; hence, decision-makers must retain sufficient flexibility to configure the CAS to best handle the particular requirements of each crisis situation. Because the system must respond flexibly, rationally and in a timely manner, there is continuing interest in research that would enhance its effectiveness. This study explores the use of simulation as a tool to help evaluate system design, rules of operation, and decision-making by the sub-elements and elements of the government that, working together, will become the CAS.

### **Research Approach**

Research was conducted in three phases:

1. Examination of the elements, operations and functions of the CAS.
2. Development of the concept of simulation and its basic structure.
3. Combining the above, and developing
  - a. examples of simulation for selected CAS operations; and
  - b. recommendations for implementation of simulations.

### **CAS Elements**

The major actors in crisis management are:

- **The National Command Authority (NCA).** The President and the Secretary of Defense.
- **The National Security Council (NSC).** The NSC has four statutory members—the President, the Vice President, and the Secretaries of State and Defense. The President may add additional members and structure the NSC as he sees fit.



- **The Washington Special Action Group (WSAG).** The WSAG is an NSC sub-committee which serves at the pleasure of the President.
- **The Special Inter-Agency Task Force.** Time permitting, a Special Inter-Agency Task Force is designated to support the WSAG.
- **The Intelligence Community.** This includes, but is not limited to, the CIA, NSA, DIA, and other elements within the DOD.
- **Joint Chiefs of Staff.** The JCS is responsible, under the direction of the NCA, for the deployment and redeployment of military forces.
- **The Worldwide Military Command and Control System (WWMCCS) and the National Military Command System (NMCS).** The WWMCCS is a command/control/communications system that provides the means for operational direction and administrative support for command and control of U.S. military forces.
- **Other Government Agencies.** Depending on crisis location and type, segments of other governmental agencies may become involved.

During normal day-to-day operations, information flowing up the chain of command is summarized, and combined with other pertinent information before being relayed to the next succeeding level of command. During a crisis, information properly designated flows directly to and through intermediate levels of command without processing to major watch centers and the White House Situation Room.

### **Operations of the CAS**

The operations of the CAS are described in three phases: problem recognition and assessment, planning for military operations, and execution of military actions. The three phases and the activities subsumed under each are described in the text. Broadly speaking, they represent a rational model wherein goals are examined, options defined, consequences of each traced out and the course of action that optimizes future values is chosen.

Throughout the operations of the CAS, four categories of tasks—all involving information processing—reoccur.

- **Information Sensing/Acceptance.**
- **Information Assessment/Synthesis.**
- **Information Interpretation/Diagnosis/Decision-Making.**
- **Preparation and Transmission of Messages and Reports.**

Crisis phases and these task categories provide an important frame and concepts for simulation.

### **Deviations from the Rational Model**

Episodic evidence and crisis case histories suggest that organizations such as the CAS often behave in ways that do not correspond with the ideal or rational model of decision-making. At least two non-ideal characteristics of organizational decision-making, referred to as Models II and III, may be encountered. Model II reflects *organizational inertia*, and *slowness to accept and deal with change*. Model III focuses on the inter- and intra-agency interactions of the CAS elements, wherein segments of the various governmental agencies that comprise the elements of the CAS are viewed as *members of a coalition*, who compete to serve national needs. These models describe organizational procedures and habits of operations which can form in daily activities and carry over into the way that agencies respond, or fail to respond to crises. Their possible existence suggests conduct of certain types of simulation as a check.

### **Simulation: Purposes and Structure**

Simulation involves the manipulation of a system, sub-system or an operating model thereof, to examine those *managerial and system action processes* by which the system performs its intended function. The elements or sub-elements of the CAS are manipulated by requiring them to perform their crisis-related functions in response to a constructed or feigned account of a crisis situation. Because of the complexity of the CAS and its supporting communications system, and the necessary continuous interactions among its elements and sub-elements, it is often difficult in system design to ascertain just which of the CAS's characteristics,



or operational guides and procedures, led to a recorded level of performance—i.e., to definitively establish cause-effect relationships. Simulation exercises may be used as management and research tools to gain a better understanding of such relationships.

Simulation may be conducted to:

1. check out existing or proposed managerial and system action processes and procedures, communications procedures and equipment, etc., for efficiency and/or workability.
2. develop information, techniques and procedures that can be used to:
  - a. identify and configure the elements and sub-elements of the CAS as appropriate for specific crisis situations.
  - b. evaluate alternative forms of element and sub-element organizational structures, authority relationships, managerial and system action processes, and process aids such as computers, data display equipment, etc.

To achieve their objectives, simulations require careful planning. This involves: clearly defining simulation purposes; bounding the element or function of interest; deriving criteria; and designing scenarios so that the capabilities of the bounded element are fully exercised and measured in terms of relevant criteria.

### **Conduct of Simulations**

Some areas as candidates of simulation are deduced from Chapters III and IV descriptions of system operation, and presented as examples of simulation. By sponsor request, emphasis in this report is on criteria *other than response time* that may be used in simulations. Four criterion perspectives can guide the planning of simulations and their scope:

- **Systemic or whole system criteria.** Criteria applicable to large scale simulations requiring the coordination of major system elements, often throughout several phases of crisis response.

- **System configuration or organizational criteria.** Criteria focusing on the effectiveness of different arrangements, system components, and data processing rules.
- **Information processing criteria.** Criteria measuring the effectiveness of the sub-elements and elements of the CAS in accepting crisis situation inputs, and integration of information, decision-making and reporting of conclusions.
- **Man-machine interaction criteria.** Criteria measuring man-machine interactions introduced by modern command/control/communications (C<sup>3</sup>) systems and data processing technology.

The four criterion perspectives often imply different simulation approaches and forms. These may include application of operation research/system analysis techniques, conduct of individual experiments, talk-through of one or more system operations, and/or computer-based simulation. Criteria, properly applied, can help to identify problems in system operation, evaluate communication strategies and guides, and/or various forms of organization; if two or more versions of a bounded element are evaluated, the criteria can indicate the relative value of each.

### **Implications for Simulation**

CAS complexity and the aforementioned problems of establishing causality both argue for use of simulation in designing a CAS for a rational and timely response to crises. The size of the CAS and its 24-hour operational commitment mean that simulation must focus selectively on carefully chosen bounded system elements. There are, admittedly, problems. The need to maintain system and information security, the lack of redundancy in system staffing, and the problems of inserting inputs to a bounded element within the system while it is on-line operating, all complicate simulation of managerial and system action processes.

These problems can be obviated in part if it can be clearly shown that off-line simulation—simulation removed from the real system—can provide information useful to the design and operating procedures of its real system counterpart. Of especial importance,

off-line simulations can be used to further investigate the capabilities and limitations of humans as CAS managers whose actions eventually determine operational success of the system. It is believed that such off-line simulations can serve to establish indices of human data processing capabilities which can then be used for advanced planning of the CAS design and for developing more effective techniques and procedures for carrying out the required managerial and system action processes.

It is recommended that selected managers of the presently constituted CAS be convened. They would identify, from the examples cited in this study or from other sources, CAS functions that are extremely difficult and critical. The identified functions would then serve as the focus for off-line simulations. Essential objectives would be to: (1) evaluate utility of findings to the on-line operating system, and (2) evaluate the feasibility of developing and using indices of human data processing capabilities in a CAS context.

The value of simulations can be still further enhanced by conducting simulations in clusters so as to compare results across individual simulations and thus maximize information yield.



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## Chapter I

### INTRODUCTION

This is the third study conducted by Human Sciences Research, Inc., in support of the ARPA-sponsored research program on crisis management. The basic objectives of the three studies are similar: namely to apply concepts, methods, and techniques from social science and human factors research to improve U.S. responses to crisis situations.

The first study<sup>1</sup> documents crisis-oriented human capabilities and limitations. These include: propensities to emotional response under stress; limitations in intellectual capabilities; limitations deriving from egocentric national thinking; and problems that groups face in coordinating decision-making in keeping with crisis time demands. In view of these problems, guidances are suggested in prescriptive form. As examples:

- Extend decision-making time.
- Provide for early diagnosis of possible crises.
- Compensate for effects of fatigue, stress.
- Structure groups for best decision-making.
- Improve information management.
- Establish a standing crisis management group.

Admittedly, these "guidances" smack of the coach exhorting his team to make many touchdowns. Nonetheless, they focus on key issues.

The second study<sup>2</sup> examines the merits of *ad hoc* versus organized groups as crisis managers. The evidence, while not completely conclusive, suggests that groups

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<sup>1</sup>Howard B. Shapiro, with the assistance of Marcia A. Gilbert, *Crisis Management: Psychological and Sociological Factors in Decision-making*, prepared for the Advanced Research Projects Agency, Human Resources Research Office, under Contract No. N00014-75-C-0004, March 1975.

<sup>2</sup>Howard B. Shapiro, and Patricia L. Cummings, *Problems in the Use of Ad Hoc Structures in DOD Crisis Management and Implications for Change*. Prepared for the Advanced Research Projects Agency, Human Resources Research Office, under Contract No. N00014-76-C-0349, March 1976.

organized and practiced prior to the onset of crises stand a better chance of operating effectively and formulating rational, measured responses than do *ad hoc* groups.

Both studies provide an appreciation of the complexities of crisis decision-making and the difficulty of trying to specify "best combinations" of system hardware, organizations, and managerial and system action processes when performance is a product of all these in combination. This study develops approaches to simulation of crisis management systems with emphasis on criteria for measurement of the quality of CAS performance.

### Background

The need for instrumentalities of the U.S. government to act in a rational and responsive way to fast moving international situations has long been recognized. The invasion of South Korea, the landing of U.S. troops in Lebanon, the Cuban Missile Crisis, the incursion in the Dominican Republic, and more recently, the Pueblo and Mayaguez incidents, all attest both to the need and the difficulty of quickly formulating and coordinating responsive actions to threats inimical to our national interests.

Many interactive problems must be solved rapidly. Information and guidance from the State Department, the Department of Defense, and the Intelligence Community, each operating under its own internal procedures, must be coordinated by the National Command Authority. Depending on the particular crisis, many other agencies of the government may be involved: DOD and other governmental agencies operate more than 100 24-hour watch centers.<sup>3</sup> No two crisis situations can be expected to be alike. Which segments of which agencies will be involved, which sources and types of information will be critical, what information needs processing, and which services and/or forces will be called on are all largely a function of the unique character of the particular crisis at hand. Differences among crises and our limited ability to anticipate crises and their response requirements represent a major impediment to detailed advanced planning.

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<sup>3</sup>Meeting with Dr. Thomas Belden, Intelligence Community Staff/PAID, CIA, 31 January 1977.



## Design of Crisis Management Systems

Recognizing these needs, concerted efforts have been made over the last two decades to satisfy demands that our international commitments place on command systems, including requirements for crisis management. Billion dollar command/control/communications (C<sup>3</sup>) technological innovations and retrofits are planned for the next decade.<sup>4</sup> Since the National Command System must operate continuously on a 24-hour basis, it cannot be shut down, disassembled, and rebuilt or replaced. Rather, innovations must, for the most part, evolve from and be compatible with, other subsystems and components in being at the time.

Efforts to improve crisis management capabilities take many forms. The "hotline" has been installed between Washington and Moscow. Satellites assist in surveillance and world-wide communications. Microwave technology increases the ability of its users to monitor communications while forcing stress on communications security. The storage capacity of computers increases as their size is reduced. The National Military Command Center (NMCC) has been renovated; the design of Unified and Specified Commands is being improved. Hard and airborne national command posts have been established. As communications systems evolve and grow, it becomes technically possible to transmit and store ever greater volumes of information.

These advances in technology suggest that the capabilities of managers and operators may well become the limiting factor in effective system operations. Situation diagnosis, and formulation of timely and considered responses become increasingly dependent on the human ability to accept, absorb, interpret, and act on an increasing variety and volume of information. Switching and filtering provide more alternatives and become more complex. "Facts" are more apt to be in storage, but their relevance may not be appreciated; retrieval strategies and agency and cross-agency accessing routines may not be fully known to technicians. Throughout, information must be winnowed and filtered in successive steps. This winnowing of information by lower level technicians and managers represents a multitude of mini-decisions, but in the process, those whose *collective decisions largely determine what information their boss will see, are rarely in a position to fully appreciate their bosses' problem.*<sup>5</sup> In sum, while technical capabilities to store and

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<sup>4</sup>Director of Defense Research and Engineering. Statement before the Committee on Appropriations of the United States Senate. *The Department of Defense Program of Research, Development, Test and Evaluation, FY 1977.*

<sup>5</sup>Graham Allison, *Essence of Decision*, page 120.

process information will undoubtedly continue to increase, no like improvement can reasonably be forecast for man's basic intellectual capabilities. Nonetheless, there are many possibilities for design of systems organizations, and procedures for complementarity so that the particular strengths of man and equipment are maximized. The great variety of alternatives possible can be evaluated and confirmed by simulation.

### **Simulation**

Simulation involves the manipulation of a system, sub-system or an operating model of either, to examine those managerial and system action processes by which the system performs its intended function. Simulation is not a solution. It is a systematic means for searching for solutions, or for examining solutions proposed.

Because of the vast scope of government organizations, and because the operative organization must remain on duty on a 24-hour basis, any simulation will be limited in coverage. Limitations may be either or both of two types. The simulation may focus on one sub-system, sub-sub-system, one set of procedures or proposed item of equipment, and/or the simulation may be confined to one set of cross-agency activities which occur somewhere in the total sequence or cycle of crisis driven system activities. Simulation may focus on a sub-system that integrates intelligence for one or more agencies; the several phase planning for crisis response by a unified command; or political strategy planning by the National Command Authority in anticipation of an outbreak of armed conflict in the Mid East. The sub-system or process of interest in a particular simulation—the bug under the microscope as it were—is here referred to as the bounded element.

Simulation may be conducted for a variety of purposes. The applications of greatest interest here are in system design and operations. This may include as examples, checking out existing and/or proposed managerial and system action processes and procedures, authority relationships, and communication rules, for efficiency and workability. Simulation may be used to identify inter-agency elements of the Crisis Action System that would be involved in a particular crisis, and to specify information routing rules and authority relationships that will pertain. Simulation may be used to check out proposed computer decision aids, data display equipment, information retrieval rules and keys, etc., etc.

## Study Emphasis

A great variety of simulations of Crisis Action Systems have been and are being conducted. To further bound areas of coverage in this report, as compared with other efforts:

1. Emphasis is essentially one-sided. It focuses on coordination of activities of U.S. agencies rather than on the interplay through time of challenge and response between antagonistic nations.
2. Emphasis is on crisis driven behavior of decision-making of groups, rather than on C<sup>3</sup> hardware.
3. Crisis types considered here are those that call for shows of force and restraint in the application of destructive force, rather than on nuclear exchanges. (Admittedly, lower level confrontations can set into motion events that could lead to nuclear confrontations to which most crisis management R&D has been oriented.)
4. At the sponsor's request, emphasis is on development of criteria for simulation, rather than on a balanced methodological treatment of the several essential ingredients of simulations. Further, emphasis is on derivation of criteria other than direct measures of response time. As all agree, under crisis conditions, the requirement for timely response is ubiquitous—time is *always* a critical criterion; but because other candidates for criteria have received relatively little attention, this exploratory study focuses on criteria other than direct measures of response time.

## Chapters to Follow

This is a three-stage study. The first stage (Chapters II, III, IV) describes the U.S. Crisis Action System and its activities. Key elements in the system and their responsibilities are covered in Chapter II. Chapter III describes hypothetically through time a sequence of system actions in response to a crisis. This is a model of the system performing as a rational actor—the dynamics of system response as the script for a training film. Chapter IV is short—incomplete. It indicates as examples ways in which system actions may deviate from those of a rational actor.

The second stage (Chapter V) develops the purposes and basic structure of simulation and sets forth five related simulation approaches.



The third stage (Chapters VI, VII) indicates by examples, how simulation approaches could be applied to CAS performance evaluation. It develops four criterion perspectives. Then by deduction from Chapter III information, we exemplify how each perspective may be applied to derive criteria for simulation. Chapter VII makes recommendations for implementation of simulations—first off-line as individual simulations, then by grouping individual simulations for greatest information yield.

## Chapter II

### ABOUT CRISES; MAJOR ELEMENTS OF THE CRISIS ACTION SYSTEM

World War II thrust the U.S. into a global role of political leadership among a community of nations whose interests and activities are increasingly interdependent. A strong, responsive, military establishment is necessary to support international political commitments that define this role. Over the same period, there has been a remarkable growth in military technology. Today's weapons have a global range, rapid delivery speeds and awesome lethality. These all represent "parameters of advantage" for a nation that can fashion a cause—access rights to the sea, restoration of historic boundaries, oppression of (own) ethnic groups, etc.—to be pursued through credible sabre rattling or a surprise first strike. Thus, in confrontations of will or arms, military technology can provide all the above advantages to its possessors.

Soon after World War II, it became apparent that the procedures and the pace usual to day-to-day management of our intelligence, military and state departments were inadequate for responding to threats that could break out in days or hours. Hence, a Crisis Action System has evolved to facilitate timely, flexible, controlled responses to highly volatile, politically delicate, time-sensitive activities of other nations that are deemed to be a serious threat to U.S. interests and objectives. The configuration of the CAS depends in part on the particular crisis. Its mode and tempo of operations and certain of its facilities have necessarily evolved as separate from the routines used for normal day-to-day coordination and management of our political, military, and economic policies and programs.

#### **Crisis Definition**

A crisis is an incident or situation external to the U.S., which develops rapidly and creates conditions of such diplomatic, political, or military importance to the U.S. government that commitment of military forces is contemplated. A *crisis situation* exists from the

time the seriousness of such an incident or situation is recognized, through the commitment of U.S. military forces or to the point where the use of the military forces is no longer being considered and they are returned to a normal posture. The primary objective of U.S. military forces is deterrence; however, when U.S. forces are employed under crisis conditions, the possibility of armed conflict always exists. (Crisis employment of military forces does not include their emergency use for natural disaster relief and for other similar humanitarian purposes.)

### **Crisis Development**

Crisis creating events may suddenly and dramatically occur without warning in areas of the world where the international and national environments have been relatively stable and trouble-free. Such events may trigger others that rapidly ascend in seriousness to produce crisis situations. The occurrence of such events, which typically represent manifestations of conflicts of will between nations or internal rivalries is difficult to anticipate. Planning for such events can go little beyond contingency plans of the broadest nature. It is extremely difficult to cope with or manage crises that are created under such conditions; it is often necessary to reposition military forces and/or establish diplomatic channels before the U.S. government can make even an initial response.

Other areas in the world are focal points of intense and continuing conflicting international and national interests, animosities, and rivalry. Such areas are almost continuously troublesome and their potential for precipitating crises is recognized and understood. Recognition of the charged atmosphere of conflict generally permits more definitive contingency planning; however, it is not possible to predict with certainty specific crisis precipitating events or their timing. Diplomatic efforts by external powers to reduce tensions in such areas may well be met with resistance and always have in themselves a potential for creating an unintended crisis situation.

### **Conditions and Events as Crisis Determiners**

There are innumerable types of incidents or events from which a crisis situation may develop. Further, similar incidents or events do not always create a crisis situation. The geopolitical



conditions and military relationships, under which the event occurs, may contribute as much or more to development of a crisis situation as the type of incident itself. During the Israeli-Arab War of 1967, the *Liberty*, a U.S. Naval vessel, was fired upon by Israel's armed forces. The vessel sustained severe damage and several crew members were either injured or killed. News reports indicated that the vessel was in international waters when the incident occurred; however, the incident did not create an international crisis. A crisis situation may well have occurred had a U.S. military vessel been attacked by a hostile foreign power. The boarding and seizure of the *Pueblo* by the North Koreans and the *Mayaguez* by the Cambodians created crisis situations; however, on several different occasions, U.S. fishing vessels have been seized in "disputed" territorial waters off the coast of South America without leading to crises. The U.S. installed offensive missiles in Turkey without a crisis developing; but the installation of offensive missiles in Cuba by the U.S.S.R. created a crisis of the highest order. Clearly, the precipitator of an event and the conditions under which the event occurs are significant. A crisis becomes a crisis when it is perceived as such by the polity of a major power.

#### **Crisis Action Mechanism**

The doctrine and mechanisms for crisis response have necessarily evolved outside the routine procedures used by the U.S. government for normal day to day coordination and management of its political, military and economic policies and programs. Other major powers with global interests and objectives have probably developed similar crisis response mechanisms. There are indications that during the Cuban crisis, Khrushchev assembled a crisis management team composed of Mikoyan, Kosygin, Suslov, Brezhnev, and Kozlov.<sup>6</sup> The United States crisis response mechanism includes a number of elements some of which have been established by law and others which have evolved as individual presidents have developed machinery to handle crisis situations. Major elements of the U.S. crisis response mechanism, as currently constituted, are:

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<sup>6</sup>U.S. Senate, Committee on Government Operations, Subcommittee on National Security Staffing and Operations, *Staffing Procedures and Problems in the Soviet Union*, 88th Congress, 1st Session, 1963.

**The National Command Authority (NCA).** The composition of the NCA is established by statute as the President and the Secretary of Defense. The Secretary of Defense as a non-elected official serves at the pleasure of the President with the concurrence of the Senate. The President has the ultimate responsibility and authority for utilization of the full range of U.S. capabilities, to include the employment of military forces, when U.S. prestige, national security, or foreign policy objectives are placed in jeopardy.

**The National Security Council (NSC).** The NSC was created by the National Security Act of 1947 to advise the President with respect to the integration of domestic, foreign, and military policies relating to national security and to assess and approve the objectives, commitments and risks of the United States in relation to our actual and potential military powers. The NSC has only four statutory members which are the President, the Vice President, and the Secretaries of State and Defense; however, the President may add other members to the NSC, create or abolish NSC subcommittees and give either great power or no power to the NSC staff. Each President has restructured the role, responsibilities, and operation of the NSC to reflect his own style of operation, changing national policies and special circumstances that existed at that time.<sup>7</sup> The NSC and its various high-level interagency committees and working groups formed under different Presidents have proved to be effective in the development and consideration of broad long-term foreign and national security policy issues; however, when a crisis situation has occurred, the Presidents have—almost without exception, resorted to an *ad hoc* management system to speed up the decision-making process.

**The Washington Special Action Group (WSAG).** The WSAG, established by President Nixon as a subcommittee of the NSC to replace the *ad hoc* crisis management system, is a management team responsible for ensuring coordinated flexible and timely responses by the responsible departments of government to presidential decisions that are made as a crisis situation develops. At present, members include the Secretary of State, who chairs the group, the Assistant to the President for National Security Affairs, the Deputy Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the Director of the Central Intelligence Agency.<sup>8</sup> The WSAG is supported on a continuing basis by the member agencies or departments and by special interagency task forces of varying composition in times of crisis. It should be noted that there is no statutory requirement for the WSAG; the group's continued existence and performance depends entirely upon the wishes and desires of the President.

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<sup>7</sup> To the extent that this report is—or was until January 20, 1977—current, it reflects in some degree, organizations established by President Nixon and kept by President Ford. According to recent press reports, the Chairman of the Council of Economic Advisors and the Secretary of the Treasury will serve as members of the NSC during President Carter's administration. It is further reported that the seven NSC staff committees that operated under President Ford's administration will be reduced to two, and that the WSAG and the Special Inter-Agency Task Force and other non-statutory elements will be eliminated.

<sup>8</sup> *The Crisis Situation and National Response*. The National War College Strategic Research Group, 17 Dec. '73.

**The Special Inter-Agency Task Force.** In times of crisis, time permitting, the WSAG is supported by a special inter-agency task force. The special inter-agency task force is composed of small groups of managers and area experts from State, Defense, CIA, the JCS, DIA, etc., who function around the clock. The exact composition of special inter-agency task forces may vary with each crisis situation. Members normally have direct *secure* communication with their counterparts who are members of the WSAG.

**The Intelligence Community.**<sup>9</sup> The Intelligence Community includes, but is not limited to, the CIA, NSA, DIA, elements within the Department of Defense for the collection of intelligence through reconnaissance programs, the intelligence components of the military services, the Intelligence Division of the FBI, the intelligence elements of the State (INR) and Treasury Departments and ERDA. The National Security Council sets *overall policy* for the intelligence community; however, *management* of the community's activities is a responsibility of the Committee on Foreign Intelligence (CFI). The Director of the CIA is responsible for *coordinating* these activities. The CFI was established as an NSC subcommittee by an Executive Order issued by President Ford. The Director of the CIA, as the President's principal foreign intelligence officer, serves as Chairman of the CFI; other members include Deputy Assistant to the President for National Security Affairs, the Attorney General, Deputy Secretary of State, Deputy Secretary of Defense for Intelligence, Under Secretary of the Treasury (Monetary Affairs), and the Chairman, Joint Chiefs of Staff.

**Military Forces and the Chain of Command.** The Department of Defense Reorganization Act of 1958 establishes a chain of command that runs directly from the NCA to the unified and specified commands, who are responsible for the employment of military forces when such actions are directed by the President. Neither the military departments nor the Joint Chiefs of Staff are in this chain of command. The objective of the Act was to ensure that the chain of command gave the President direct control over the unified and specified commands with a minimum of delay. The CINC's of the unified and specified commands play a major role in developing military course of action alternatives that will satisfy the response options being considered by the NCA. The unified or specified command with responsibility for carrying out an NCA-approved military course of action is designated as the supported command. Unified and specified commands and/or agencies that provide resources to augment the supported command's organic capability are designated as supporting commands.

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<sup>9</sup> 94th Congress, 2nd Session, Senate Report No. 94-755. *Foreign and Military Intelligence, Final Report of the Select Committee to Study Government Operations with Respect to Intelligence Activities.*



**Joint Chiefs of Staff Involvement.** While the Department of Defense Reorganization Act of 1958 does not place the Joint Chiefs of Staff directly in the chain of command, many members of the Joint Chiefs and their supporting staffs are likely to be involved in any crisis situation. The JCS is responsible, under the direction of the President and the Secretary of Defense, for the deployment and redeployment of military forces. Such deployments, the states of readiness and preparedness of the combat forces and their mobility capabilities are essential elements of information for planning political-military response options and actions. The Chairman of the Joint Chiefs has administrative management responsibility for the Defense Communications Agency, which has executive responsibility for providing the communications facilities and hardware used in day-to-day military operations and the National Military Command system that comes into play during a crisis situation. The Joint Chiefs and their supporting staffs are also a prime source of trained personnel for augmenting those segments of the CAM that normally exist only in skeletal form during day-to-day operations. Their ties to unified and specified commands, to the services from which they are drawn and their experience in overseas areas, all make them walking sources of crucial information that may be vitally needed during a crisis situation but which cannot be completely specified in advance.

**The Worldwide Military Command and Control System (WWMCCS).** The WWMCCS is a command/control/communications system that provides the means for operational direction and technical administrative support involved in the function of command and control of U.S. military forces. The National Military Command System (NMCS), which is the highest priority element of the WWMCCS, is designed to support the NCA in exercising its responsibilities. The Chairman of the Joint Chiefs of Staff operates the NMCS for the Secretary of Defense to meet the needs of the NCA. The NMCS has at least three separate command centers and associated communications systems by which the NCA can exercise its responsibilities. The Alternate National Military Command Center (ANMCC) is an underground hardened command center that could be used in the event of a general war. The National Emergency Airborne Command Post (NEACP) is kept on alert at Andrews AFB in Maryland for the use of the NCA in the event that a nuclear exchange appears imminent. The National Military Command Center (NMCC), which is a soft facility located in the Pentagon, is used in the day-to-day support of the NCA. The NMCC is the focal point and nerve center of the WWMCCS. The recent renovation, which nearly doubled the size of the NMCC, permits senior officials to concentrate on a crisis situation or area while simultaneously monitoring and controlling routine activities in other parts of the world. Multiple and secure communications can be established with all the unified and specified commands within 20 seconds. The processing and display of information was also enhanced by the expansion of the NMCC. The Washington terminal of the Moscow hotline is located in the facility. The NMCC and the co-located National Military Intelligence Center (NMIC) are fully manned 24 hours a day by a permanent staff that includes full-time representatives from State, CIA, DIA, and DOD who are linked to their parent departments or agencies through direct secure communications. The NMCS, through its command centers and indication and

warning centers, provides not only a means by which the NCA can receive intelligence and other information essential for timely decisions, but also a means for exercising the employment and control of U.S. military forces.

**Other Government Agencies.** In addition to the elements of the CAS discussed above, segments of any number of other governmental agencies might be involved in a particular crisis situation. For example, the Maritime Commission was involved in the Mayaguez incident. The Federal Aviation Administration was involved in the Cuban Missile situation, when military aircraft were deployed to civilian airfields. Crisis situations may create a need for coordination with the Office of Emergency Planning and the Office of Civil Defense. The locus of the crisis, the nature of the geopolitical-military conflict and the actions that are considered and/or taken determine which agencies will be involved and their roles.

**The Congress.** The War Powers Resolution, a joint resolution passed by both Houses on November 7, 1973, requires the President in every possible instance to consult with the Congress before introducing the United States Armed Forces into hostilities or into situations where imminent involvement in hostilities is indicated. When the President commits U.S. Armed Forces under such circumstances and in the absence of a declaration of war, he must respond in writing to the Speaker of the House of Representatives and the President pro tempore of the Senate within 48 hours. The report must set forth the circumstances, his supporting constitutional and legislative authority, and the estimated scope and duration of the hostilities or involvement. The Resolution requires the President to terminate any use of the Armed Forces within sixty days unless the Congress has either declared war or has enacted specific authorization for the use of the Armed Forces. The Resolution also requires the President to report to the Congress periodically (at least once every six months) so long as the Armed Forces are so involved.

#### **Crisis and Non-Crisis Operation**

During day-to-day operations, information flows up and down the normal chain of command through the NMCS. At each level of command, the information is digested, analyzed, summarized, and combined with other pertinent information before being relayed to the next succeeding level of command.<sup>10</sup> This is the usual mode of handling reports by large organizations. Some have compared this mode of operations to series circuits in an electrical system. In contrast to the series mode, messages may follow a path that is analogous to a parallel circuit

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<sup>10</sup> Technical Report No. 62-18. Final Report, *Studies of Command and Control, The Strategic Direction of the Armed Forces*. Institute for Defense Analyses, Research and Engineering Support Division, August 1962.

in an electric system. In particular, information about crises or crisis harbingers are classified and communicated as CRITIC (Critical Intelligence Information) or as OPREP-3 (Event/ Incident Report of Possible National Interest). Such messages should follow a parallel path, in that information flows directly to and through intermediate levels of command without processing or delay to the White House situation room. Intermediate levels of command are of course informed by the message(s) which they may also communicate laterally to other service elements or government agencies.

### **Summary**

The Crisis Action System, which has evolved outside the routine procedures used by the U.S. government for normal day-to-day coordination and management of its political, military and economic policies and programs, has and must retain sufficient flexibility to reconfigure itself to cope with the differing requirements of each crisis situation. The specific configuration of the CAS for a particular crisis situation depends primarily upon the nature of the geopolitical-military conflict, the location of the crisis situation and the response options chosen by the NCA.



### Chapter III

## OPERATION OF THE U.S. CRISIS ACTION SYSTEM

The same basic functions of the U.S. Crisis Action System are performed each time the system is cycled; however, the manner in which these functions are performed may vary with each crisis situation. Likewise, many of the specific subcomponents and their roles and interactions are likely to differ, depending on the nature of crisis events that can trigger the system. Because of this, the operation of the CAS can only be analyzed in general terms by identifying the basic functions that are performed, the actions that are taken and/or the decisions made, and by types of interactions that occur when the system is cycled.

In this discussion, the *operation cycle* of the CAS is arbitrarily broken into three phases, each of which reflects a logical grouping and sequencing of functions. This grouping and sequencing helps identify and classify tasks and actions crises require of the system. *It is not intended to reflect exactly the CAS's real world order of operation.* In a crisis situation, some functions may be performed *before* the mechanism is triggered into operation. Once the mechanism is triggered, some functions may be performed sequentially while others are performed concurrently; in the press of time, some functions may be skipped. Each phase and the functions that have been grouped under it are discussed in the sections that follow.

Government agencies must continue many activities required by the normal day-to-day management and coordination, even though a crisis situation develops. When an event or situation triggers the CAS into operation, the nature of the event or situation determines in large part which segments of which agencies will be involved. Some segments of some agencies will be heavily involved; others moderately, minimally or not at all. Prior to the onset of a crisis situation, activities proceed according to the assignment of priorities dictated by agency routine; however, once a crisis develops, things may change drastically for the various agency segments involved.

- The crisis situation creates and imposes its own tasks.
- Crisis tasks are often non-routine tasks that must be performed within most urgent time constraints.

In addition, the individuals that comprise the involved segment(s) of an agency may be working on quite different time clocks. Some will be working full time on the crisis situation. Others will be uninvolved; still others will be working on both the crisis situation and their own agency clocks with crisis demands typically having priority. Further, crises require rapid establishment of communication nets that differ from those typical of daily routine.

- Inter- and intra-agency groups and individuals who do not normally work together are drawn into close collaborative relationships.
- Crises require different strategies and techniques for accessing data banks, and for data retrieval.
- The substantive nature of messages differ as between crisis and non-crisis operations, and much high priority communications traffic is generated. Certain system elements will almost surely be overloaded.

All these events occurring suddenly—largely unexpectedly—suggest that the transition from non-crisis to crisis operations is obviously difficult.

Before discussing the operation of the CAS, one caveat is worth mention: in a world of thermonuclear weapons, crisis avoidance through anticipation of events and diplomacy is the preferred course. *Crisis action represents a fallback position.* Deterrence, according to General Brown,<sup>11</sup> Chairman of the Joint Chiefs of Staff, is the prime mission of the U.S. military forces. The fact that hostile incursions are so serious as to constitute crises is clear evidence that their precipitators were not deterred. It may be possible by diplomatic initiatives to (a) prevent the drift of events that are harbingers of crises, or (b) *backed by sufficient military strength*, act to restabilize a deteriorating situation and to maintain our position as the

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<sup>11</sup> Statement by General George S. Brown, Chairman, Joint Chiefs of Staff, Hearings before a subcommittee of the Committee on Appropriations, House of Representatives, DOD Appropriations for 1976, Feb. 26, 1975.

leader of the free world nations. The vast areas of crisis avoidance diplomacy are not our subject. This report deals with events which are interpreted by the National Command Authority as being the precipitators of crises.

### **Phases of Crisis Operations**

The following pages describe the operations of the Crisis Action System in three phases.

- Phase I. Problem Recognition and Assessment**
- Phase II. Planning for Military Operations**
- Phase III. Execution of Military Actions**

#### **Phase I. Problem Recognition and Assessment**

The crisis action mechanism is triggered into action when a responsible *government official* at some echelon of command becomes aware of, perceives and reports, an unusual event or situation as being a potentially serious threat to U.S. national objectives or interests. The three functions grouped under the problem recognition and assessment phase are:

- I. Problem Recognition and Reporting**
- II. Alerting Senior Officials to the Problem**
- III. Problem Review and Assessment at the Senior Official/NCA Level**

#### **I. Problem Recognition and Reporting**

Tasks performed, actions taken, and decisions made as a problem is recognized and reported are depicted in Figure 1. Generic information processing tasks are identified in the third column and discussed in greater detail on pages 40-42.



**Figure 1.**  
**PROBLEM RECOGNITION AND REPORTING**

<b>Elements of the CAM Involved</b>	<b>Actions Taken and/or Decisions Made</b>	<b>Generic Tasks</b>
A responsible government official at any echelon of command who becomes aware of an unusual event or situation.	(1) <i>Decision:</i> Perceives the conditions created by the event or situation as being a threat or potential threat to U.S. national objectives.	(1)a. Information sensing/acceptance (1)b. Information assessment/synthesis (1)c. Information interpretation/diagnosis/decision-making.
	(2) <i>Action:</i> Reports the event or situation to a national level command center or, if first recognized at a national command center, reports to other interested agencies.	(2) Preparation and transmission of reports and messages.

**The eyes and ears of the U.S. government.** Many government agencies, by virtue of their missions and responsibilities, collect and assimilate information from many different sources. The intelligence community, officials of the U.S. State and Defense Departments and other governmental agencies who are responsible for the day-to-day management and coordination of ongoing foreign political, military and economic policies and programs serve as the eyes and ears for alerting the U.S. government to unusual events or situations that are or may become serious threats to national objectives. All operate on a global scale. Agencies responsible for foreign intelligence activities may function either overtly or covertly through, in conjunction with, or independent of, other U.S. government agency and private sector organizations that are involved in foreign activities. The State Department normally carries out its responsibilities through the diplomatic missions that are assigned to the embassies and/or consulates located in those countries with whom the U.S. maintains diplomatic relations. Other U.S. government agencies oftentimes carry out their foreign responsibilities through attaches that are attached to the State Department's diplomatic missions. The diplomatic missions of friendly third party nations may serve as communications links between

the U.S. and nations that are unfriendly to the U.S. The military establishment generally carries out its foreign responsibilities through either the unified and specified commands, which normally include U.S. military and combat forces, or through Military Assistance Advisory Groups, which assist other nations in the purchase, operation and maintenance of U.S. military equipment and with the training of their military forces.

Various segments of the United States private sectors are also deeply involved in foreign activities. Many U.S. nationals, who are officials of U.S. firms, members of the press, or members of other occupations, live and work in foreign nations. Some may have such close contacts with foreign officials that they become cognizant before U.S. government officials of political, military, or economic activities that could have an adverse effect on U.S. national objectives.

**Problem recognition.** Some events may be so catastrophic, or so obviously inimical to U.S. objectives that they are readily discernible as threats. The significance of other events may be more difficult to interpret; they may not be perceived as a threat when they actually are, or they may be perceived as a threat when U.S. interests are not jeopardized. An official's ability to determine the significance of an event may be hampered by doubts as to what extent a situation, which he may become aware of only through bits and pieces of information, is in conflict with stated U.S. policy and objectives. Reporting ability may be hampered by ill-defined reporting responsibilities, the individual's placement within the organizational structure, or by his agency's interaction, or lack thereof, with other governmental entities. Problem recognition may be further complicated by the fact that a particular event represents no threat to U.S. national objectives or interests unless it occurs in conjunction with other events that have occurred or are occurring in other locations. The official who first becomes aware of a particular event may not know about related events which are occurring elsewhere.

## II. Alerting Senior Officials to the Problem

The tasks that are relevant to the actions that are taken and the decisions that are made as senior officials are alerted to the problem are depicted in Figure 2.

**Figure 2.**  
**ALERTING SENIOR OFFICIALS TO THE PROBLEM**

Elements of the CAM Involved	Actions Taken and/or Decisions Made	Generic Tasks
Duty and watch officers in one or more of the National Command Centers.	(1) <i>Decision:</i> Perceives the reported situation in itself or in conjunction with other known information to be a problem.	(1)a. Information sensing/ acceptance (1)b. Information assessment/ synthesis (1)c. Information interpretation/ diagnosis/decision-making.
	(2) <i>Action:</i> Alerts senior officials and other command centers as appropriate.	(2) Preparation and transmission of reports and messages.

**Senior official routine activity briefings.** Senior officials of governmental agencies involved in international affairs are normally made aware of routine worldwide activities through daily or almost daily briefings. The briefings, which are normally prepared and given by staff area experts, are developed from information that flows from reporting officials who are located throughout the world through indication and warning centers of situation rooms. The one hundred-plus warning centers maintained by DOD and other governmental agencies will have various degrees of involvement. Central indications and warning centers such as the White House situation room, the NMCC, and situation rooms operated by the State Department and by the intelligence community, and the warning centers of the unified and specified commands who exercise surveillance over the area in which the crisis occurs, will be involved in any crisis situation.



### **Indications and warning center *modus operandi* for alerting senior officials.**

The *modus operandi* of the indication and warning centers normally permits direct communications any time of the day or night between the centers themselves and between the centers and senior officials or their designated representatives. The NMCC, which is the focal point or nerve center of the NMCS, keeps constant tabs on the whereabouts of some 85 to 90 senior officials from different branches of the government. Indication and warning center administrative procedures for handling communications vary with the priority, designator, classification, etc., placed on a communication by the originator. The administrative procedures normally provide for communications that have been given certain priorities, designators, classifications, etc., to flow through the centers directly to senior officials and to centers of other agencies with little or no intervening delay for *information assessment/synthesis*. Intermediate echelons of command, including center officers, are not likely to downgrade the priority, designator, classification, etc., placed on a communication by a reporting official; however, they may upgrade the status of a communication and send it directly to senior officials when its content, *in conjunction with other known events or situations*, is perceived to represent a potentially serious problem. If a communication does not go directly to senior officials as a result of the priority, designator, classification, etc., placed on the communication by the reporting officials or as a result of being upgraded by watch officers, senior officials will probably first become aware of the reported event or situation through a routine activity briefing.

### **III. Problem Review and Assessment at the Senior Official Level**

The tasks relevant to the actions taken and the decisions made as a problem is reviewed and assessed at the senior official level are depicted in Figure 3.

**Figure 3.**  
**PROBLEM REVIEW AND ASSESSMENT AT THE**  
**SENIOR OFFICIAL/NCA LEVEL**

Elements of the CAS Involved	Actions Taken and/or Decisions Made	Generic Tasks
Senior officials: State, Defense, CIA, JCS, President's Advisor for Foreign Affairs, etc.	(1) <i>Action:</i> Individually review all reported and readily available information applicable to situation.	(1) Information assessment/synthesis
	(2) <i>Decision:</i> Individually perceive on the basis of available information, the situation to be or not to be a <i>crisis</i> . Tentatively identify options for alleviating the threat.	(2) Information interpretation/diagnosis/decision-making.
	(3) <i>Action:</i> Reviews with senior officials, individually and collectively, their perceptions of the situation and options for alleviating the threat.	(3) Information assessment/synthesis
	(4) <i>Decision:</i> Perceives the situation to be or not to be a <i>crisis</i> . Identifies objectives to be achieved and tentatively approves options for achieving objectives. Specifies constraints pertinent to options.	(4)a. Information interpretation/diagnosis/decision-making. (4)b. Preparation and transmission of reports and messages (oral and written).
NCA (National Command Authority)		

**Problem review and assessment by senior officials.** Assessment of situations whose diplomatic, political, or military significance is less readily discernible, oftentimes entails extensive processing of complex and perplexing information within and between different governmental agencies in a very compressed time period. Senior officials who advise the President may demand from supporting agencies both additional information and more frequent reports from identified areas of tension and surrounding spheres of influence. This, in turn, greatly increases communication traffic within and between agencies. The need for frequent readings from the crisis scene adds to the increasing volume of communication traffic. The pace quickens. Well-established

information collection and processing interactions and interrelations within and between agencies may be disrupted and new interactions and interrelations may evolve for the specific purpose of interpreting and expediting the flow of information to senior officials who will assess the situation or problem.

The several strands of the problem—political, military, economic, etc.—must be pulled together and viewed in context. Concurrently, senior officials are attempting to infer the drift of events, and how they may be appraised by key foreign nationals of other countries. Throughout, two types of expertise are needed in depth: content knowledge pertinent to the context in which the crises is occurring; and a detailed appreciation of the nerve centers of government—i.e., responsibilities and operating routines of agencies, and key individuals who can best contribute to problem assessment.

**Problem assessment by the NCA.** Several salient aspects of NCA decision-making consistently emerge from accounts of prior crises. Included among considerations that are basic to the use of military forces and their assigned rules of engagement (ROE) during a crisis situation are:

1. **Decision-makers confronted by uncertainties.** The NCA may be uncertain as to what precisely has happened. (During the Pueblo incident, the White House could not immediately determine what the Pueblo was.) It may not be clear that the reported violation of international comity represents the political policy of the nation whose armed forces have committed the violation. There will surely be uncertainty as to the reaction of allies, neutral and hostile nations to whatever military/diplomatic initiatives we take including, of course, a decision to take no action.
2. **Policy formulation/interpretation.** U.S. objectives are necessarily broadly defined. It cannot reasonably be expected that objectives will be precisely formulated in advance to handle every imaginable crisis. Driven by the fast moving events that signal crises, substantial time and high level effort may be required to articulate national objectives as they pertain to the situation at hand, and to derive and evaluate options. Such deliberations may result in the consideration of options not contemplated in existing CONPLANS and OPLANS.



3. **Translation of options into mission plans.** The exercise of options for the use of military forces will be influenced and often constrained by capabilities and state of readiness of military forces, and the time required to deploy them to the crisis scene.
4. **Uses of military forces.** Clausewitz said that war is politics pursued by other means, and that in war the objective of each antagonist is to exert his own force to the utmost, to make the enemy incapable of further resistance. This strategy was followed in times past but the existence of nuclear weapons calls for a different philosophy. Confronted by crises situations, since World War II presidents have used military capabilities in two ways:
  - a. **As non-violent reminders of forces in being, and signals of U.S. determination and intent.** This symbolic use has in some cases led to ROE such that we avoid firing the first round. In the Cuban Quarantine, it involved assuming the tactical risk of bringing U.S. ships closer to Cuba to give antagonists more time to think. Then, contrary to the Navy's blockade doctrine, some Russian ships were allowed to pass through. In the landings in Lebanon in 1958, no destructive force was used. In landings in the Dominican Republic, use of destructive force was held to a minimum.
  - b. **Use of destructive power of non-nuclear weapons to their full capabilities, within carefully defined political and geographical bounds** (Vietnam, Korea). Such constraints, which may limit the ability of military commanders to accomplish their mission as traditionally perceived, will likely be applied in the event of future confrontations. An appreciation of the reasons for constraints by senior commanders can help assure that conduct of operations and ROE are compatible with our national interests as defined by the NCA.

In limited conflict, the plans for use of military force, and execution of plans will reflect selection of one class of these options. If shows of force (4a. above) prove unsuccessful, tactical use of destructive force (4b. above) may be indicated. Exercise of either option requires carefully thought out rules of engagement for application by forces on the scene.

5. **Foreign appraisals.** It is unavoidable that our announced policies and responses to crises will be of great interest and concern to polities of other nations—allies and friends, neutrals and ideological antagonists.
6. **Domestic considerations.** Similarly, the President can be certain that his decisions will be reviewed by the Congress—note the War Powers Resolution of 1973, summarized on page 15—and the American citizenry through accounts by public media.

Foreign and domestic considerations are frequently occurring crisis problems, as reported by a recent CACI study.<sup>12</sup>

7. **News leaks.** Growth of worldwide communications facilities is not restricted to military users. The prospect that a major nation may employ its military forces in shows of force or in low intensity conflict is news of great significance. In spite of security precautions, the word that something is afoot can leak. Further, deployments of U.S. military forces beyond their customary areas and orbits of influence can be interpreted as signals. It is well to assume that contemplated moves may become subjects of speculation in the press—a possibility that increases as course of action and execution planning continue in Phase II. This in turn suggests as a precautionary measure a need for early formulation of a U.S. position for (possible) discussion with allies, and for subsequent broadcast to worldwide audiences.

Confronted with crisis situations, senior officials who serve as immediate advisors to the President may disagree. They may disagree as to the seriousness of the threat to U.S. objectives; however, the President's assessment of the situation or problem will normally reflect some degree of consensus with his immediate advisors. Some reliance on consensus will likely remain throughout the crisis situation.

Upon completion of the problem review and assessment tasks by the NCA, senior officials communicate the decisions with necessary instructions to their subordinate commands.

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<sup>12</sup>Leo A. Hazlewood and John J. Hayes. *Planning for Problems in Crisis Management*. Arlington, Virginia: CACI, Inc.—Federal, Report prepared for the Defense Advanced Research Projects Agency, under Contract No. N00014-76-C-0454, September 1976.

## **Phase II. Planning for Military Options**

At this point in the operation cycle of the CAS, it has been determined that a crisis situation exists; i.e., the problem has been recognized and assessed and the commitment of military forces is being contemplated. *In most crisis situations, both diplomatic and military options for alleviating the situation will be contemplated;* however, this discussion is concerned only with military options. The four functions that have been grouped under the planning for military options phase are:

- I. Warning Appropriate Military Commanders, Agencies and Services of the Situation**
- II. Course of Action Planning and Recommendations**
- III. JCS/NCA Course of Action Approval**
- IV. Military Action Execution Planning**

### **I. Warning Appropriate Military Commanders, Agencies and Services of the Situation**

The tasks relevant to the actions taken and the decisions made as appropriate military commanders, agencies and services are warned of the situation, are depicted in Figure 4.



**Figure 4.**  
**WARNING APPROPRIATE MILITARY COMMANDERS,**  
**AGENCIES AND SERVICES OF THE SITUATION**

Elements of the CAM Involved	Actions Taken and/or Decisions Made	Generic Tasks
JCS	(1) <i>Action:</i> JCS reviews the operational and logistical implications of military options under consideration.	(1)a. Information sensing/acceptance (1)b. Information assessment/synthesis
	(2) <i>Decision:</i> Military courses of action are specified and command arrangements established.	(2) Information interpretation/diagnosis/decision-making.
	(3) <i>Action:</i> JCS publishes a warning order providing guidance to affected military agencies. Includes courses of action to be considered, NCA objectives and pertinent constraints.	(3) Preparation and transmission of reports and messages

**JCS review of operational and logistical implications.** In reviewing the operational and logistical implications of military options, the JCS, as advisors to the NCA, are concerned not only with the current status and capabilities of U.S. military forces but also with data that reflect advanced basing requirements, overflight rights, allied assistance that might be needed to support particular options, etc. Those forces, including strategic mobility resources, that can be made readily available are identified along with any major constraints that might delay their actual commitment. Military courses of action and command arrangements are identified and developed through the synthesis of such data and information. The need to designate an alert condition or a specified deployability posture in order to reduce reaction time may also be determined during the review of the operational and logistical implications of the military options that are under consideration.

**The JCS Warning Order.** The JCS Warning Order directs the appropriate military commands and agencies to initiate courses of action planning. The precise contents of Warning Orders may vary widely; however, the NCA objectives, the anticipated missions or tasks, pertinent constraints and tentative major combat forces available to the commander for planning are always included in the communication content. The Warning Order leaves maximum flexibility to the supported commander<sup>13</sup> in determining how to carry out the assigned mission and tasks within any constraints that may have been imposed by the NCA.

## II. The Course of Action Planning and Recommendations

The tasks relevant to the actions taken and the decisions made in the courses of action planning and recommendations are depicted in Figure 5.

**Figure 5.**  
**COURSE OF ACTION PLANNING AND RECOMMENDATIONS**

Elements of the CAM Involved	Actions Taken and/or Decisions Made	Generic Tasks
Designated Supported Commander	(1) <i>Action:</i> Designated supported commander reviews the situation and develops alternate courses of action.	(1)a. Information sensing/acceptance (1)b. Information assessment/synthesis
	(2) <i>Decision:</i> Recommends a course of action that will satisfy NCA objectives within established constraints.	(2) Information interpretation/diagnosis/decision-making
	(3) <i>Action:</i> Reports his estimate of the situation and recommended course of action to the JCS.	(3) Preparation and transmission of reports and messages

<sup>13</sup>Supported Commanders are those joint or specified commands, as designated by the NCA, with direct responsibility for executing the contemplated military action. Supporting Commands are those joint and specified commands that are responsible for providing logistical and combat support that exceeds the supported command's organic capability.

**Course of action development.** Based upon the guidance provided in the JCS Warning Order, the designated supported commander will: (1) develop courses of action for submission to the JCS; (2) select and alert supporting forces; and (3) initiate deployability posture reporting. All courses of action available to the supported commander, based on his estimate of the situation, will be submitted to the Joint Chiefs of Staff, along with the commander's recommended course of action. Courses of action may be developed by modifying and adapting an approved operation plan (OPLAN); by expanding an existing concept plan (CONPLAN) or by development of an operation plan in those cases where existing OPLAN's or CONPLAN's are not applicable to the missions or tasks specified in the JCS Warning Order.

**The commander's estimate and recommendation.** The commander's estimate and course of action recommendation is the response to the JCS Warning Order. It is a record communication that reflects the supported commander's analysis of various courses of action that may be employed to accomplish the assigned mission and his recommended course of action. Its essential requirement is to provide the JCS and NCA with viable military courses of action. Normally, recommendations *will center on military capabilities in terms of forces available, response times, and significant logistic considerations.* Commander's estimates and recommendations are normally prepared in a standard format.

### **III. JCS/NCA Course of Action Approval**

The tasks that are relevant to the actions taken and the decisions made as the JCS and NCA approve a course of action are depicted in Figure 6.



**Figure 6.**  
**JCS/NCA COURSE OF ACTION APPROVAL**

Elements of the CAM Involved	Actions Taken and/or Decisions Made	Generic Tasks
NCA/JCS/NSC/WSAG	(1) <i>Action:</i> JCS refines the supported commander's recommended course of action as necessary and presents to the NCA and other appropriate senior officials.	(1)a. Information assessment/synthesis (1)b. Information interpretation/diagnosis/decision-making (1)c. Preparation and transmission of reports and messages.
	(2) <i>Decision:</i> The NCA (President) in consultation with other senior officials, approves the recommended course of action for execution planning with or without modification.	(2) Information interpretation/diagnosis/decision-making
	(3) <i>Action:</i> JCS issues an Alert Order to relay the NCA decision to the appropriate commanders, agencies and services.	(3) Preparation and transmission of reports and messages

**Course of action approval.** In considering a recommended course of military action for approval, the NCA, in consultation with other appropriate senior officials, evaluates the potential beneficial and adverse diplomatic, political and military ramifications of all military course(s) of action under consideration. Predicting how friendly, neutral, and unfriendly governments will respond to military actions initiated by the U.S. government can never be done with certainty, nor can the outcome of military actions be surely anticipated; nevertheless, the approval of a course of action must be based on the best estimates of such responses and outcomes.

**The JCS Alert Order.** The JCS Alert Order is a record communication that directs the appropriate military commands and agencies to initiate course of action *execution planning*. The

Alert Order applies to both the supported and supporting commands. Although its specific contents may vary widely depending on the nature of the crisis and the degree of prior planning, it will generally follow the major topics of an operation order as set forth in appropriate guidance documents.

#### IV. Military Action Execution Planning

The tasks relevant to the actions taken and the decisions made as the military action execution planning function is performed are depicted in Figure 7.

Figure 7.  
MILITARY ACTION EXECUTION PLANNING

Elements of the CAM Involved	Actions Taken and/or Decisions Made	Generic Tasks
Designated Supported and Supporting Commanders	(1) <i>Action:</i> The development and preparation of an operation order that reflects the detailed and coordinated plans of both the supported and supporting commanders by executing the course of action at a designated or later time.	(1)a. Information assessment/synthesis (1)b. Information interpretation/diagnosis/decision-making (1)c. Preparation and transmission of reports and messages

**Execution planning.** Execution planning begins with the issuance of the JCS Alert Order and ends when the decision is made to execute the action or when the commitment of military forces is no longer being contemplated. Force preparation and deployability posture reporting are normally a part of the execution planning. The end product of execution planning is an operation order (OPORD) that is published with an actual troop list, a firm movement plan (if required), instructions for the conduct of operations in the objective area, and the logistic and administrative plans for support of the operation, and intelligence pertinent to the operation.

### Phase III. Execution of Military Actions

The functions performed by the Crisis Action System that have been grouped under Phase III of the operation cycle are:

- I. The Decision to Execute Military Action
- II. The Commitment of Military Forces
- III. Situation Monitoring After Commitment of Military Forces

#### I. The Decision to Execute Military Action

The tasks relevant to the actions taken as the decision to commit military forces is made are depicted in Figure 8.

**Figure 8.**  
**THE DECISION TO EXECUTE MILITARY ACTION**

Elements of the CAM Involved	Actions Taken and/or Decisions Made	Generic Tasks
NCA/JCS/NSC/WSAG	(1) <i>Action:</i> The NCA (President) reviews with the appropriate senior officials their current individual and collective perceptions of the situation.	(1) Information assessment/synthesis
	(2) <i>Decision:</i> The President decides in consultation with his senior advisors, to execute military action.	(2) Information interpretation/diagnosis/decision-making
	(3) <i>Action:</i> JCS issues an order to the supported commander to execute the OPORD committing military forces.	(3) Preparation and transmission of reports and messages

**The execution decision.** The distinction between using forces to communicate determination by manifest shows of force and their use in a destructive capacity (page 26) becomes especially important. In some cases, shows of force may make the adversary accept the *status quo* or escalate. The use of force in a destructive capacity usually represents an escalation—an escalation which can prompt a counter-escalation by an adversary. The risk of losing control is then ever-present. Hence, the possible advantage of delaying the decision to use U.S. forces in a destructive capacity may override the tactical advantage that often goes to the side that strikes first. Note that missions involving public shows of force are in some senses inimical to effective conduct of destructive missions, since the show sacrifices surprise. The execution decision and its timing is clearly a presidential decision. Its particulars should be made known to all agencies who subsequently need to monitor its impact.

**The execution order.** The execution order issued by the JCS is a record communication that authorizes and directs the supported and supporting commanders to commit military forces in accordance with an approved OPORD or to reposition forces in preparation to execute an NCA decision. Some crisis situations may be so time-sensitive that Warning and Alert Orders are not issued. When Warning and Alert Orders have been issued, the Execution Order content will consist of little more than the authority to execute the planning operation at a particular time. If Warning and Alert Orders have not been issued, the Execution Order must be expanded to include all information and guidance essential for planning the operation. It should be noted that under the recently enacted War Powers Act, the President is required to consult with the Congress prior to the commitment of military forces, and to report the circumstance in writing within 48 hours after commitment. (See Chapter II, page 15 .) In some cases, certain allies are notified prior to the actual military action.

## **II. The Commitment of Military Forces**

The tasks relevant to the actions taken and the decisions made with military forces are committed, are depicted in Figure 9.



**Figure 9.**  
**THE COMMITMENT OF MILITARY FORCES**

Elements of the CAM Involved	Actions Taken and/or Decisions Made	Generic Tasks
Designated Supported and Supporting Commands	(1) <i>Action:</i> Supported and supporting commands deploy forces and/or initiate actions directed in the OPORD. Participating military forces and units report significant friendly and enemy activities as the operation proceeds.	(1) Preparation and transmission of reports and messages.
	(2) <i>Decision:</i> The supported commander (and/or JCS) revises the operation plan if necessary as a result of reported friendly or enemy activities to ensure that the NCA objectives are satisfied.	(2) Information interpretation/diagnosis, decision-making

**The military operation.** The JCS Execution Order normally establishes the time phasing for the military operation. The OPORD for the operation normally specifies the actions that are to be taken and the time that the actions are to be performed by each of the participating military forces and units. Command, control and coordination of the operation is maintained through the chain of command as established in the OPORD. An operation may or may not involve actual combat engagement; however, there is almost always a *possibility* of combat engagement when U.S. military forces are committed under a crisis situation. The information that is required to exercise command, control and coordination is obtained from operational reports of both friendly and enemy activities that flow up through the designated chain of command for the operation. The information provided in the operational reports is processed and assessed at the appropriate echelons of command and the operational plan revised or modified as necessary to ensure that NCA objectives will be satisfied within the constraints that have been established.

### III. Situation Monitoring After Commitment of Military Forces

The response to any military action initiated by the U.S. Government cannot be predicted with certainty; therefore, the NCA is vitally concerned once an action has been initiated not only with how the military operation is proceeding, but with the response of friendly, neutral, and unfriendly governments to the action. The tasks that are relevant to the actions taken and the decisions made as the situation is monitored after the commitment of military forces is depicted in Figure 10.

**Figure 10.**  
**SITUATION MONITORING AFTER THE COMMITMENT**  
**OF MILITARY FORCES**

Elements of the CAM Involved	Actions Taken and/or Decisions Made	Generic Tasks
NCA/JCS/NSC/WSAG Designate Supported and Supporting Commanders	(1) <i>Action:</i> Senior officials and the NCA (President) monitor and assess on a continuing basis, military activities and the reaction of friendly, neutral and unfriendly governments to the commitment of U.S. military forces.	(1)a. Preparation and transmission of reports and messages (1)b. Information assessment/synthesis
	(2) <i>Decision:</i> The President may, in consultation with the senior officials, at any time during the operation decide to terminate the military action, impose additional or remove previously established constraints or to initiate new or additional actions.	(2) Information interpretation/diagnosis/decision-making

**Situation monitoring during military operations.** The response of friendly, neutral, and unfriendly governments to the commitment of U.S. military forces is normally monitored and reported through the State Department's embassy/consulate system and by those agencies within the intelligence community that are responsible for foreign intelligence activities and through the world press and news broadcasts. Communications technology has progressed to the point where the NCA and senior officials are normally kept abreast of the on-scene activities as reported by the field commanders engaged in combat or military operations; however, the lack of sophisticated communications equipment available to the front line commander may hamper the receipt of complete information at the national level. When U.S. military forces have been committed, senior officials and the NCA monitor the flows of diplomatic, political and military information relevant to the situation on an almost continuous basis until such time as the objectives of the military operation have been achieved.

### Summary

In the preceding discussion the *operation cycle* of the CAS was described in three phases each of which reflect a logical grouping and sequencing of the functions performed. Each function was then analyzed and the tasks relevant to the actions taken and/or decisions made as the functions are performed were identified and classified. A summary of the classifications of tasks is reflected in Figure 11. At a general level, the tasks—all involving information processing—are classified into four categories. The precise duties information processing subsumes will differ depending on the information content and the position of the information processor in the command chain. Overlooking for the moment these substantial differences, note that tasks are recurrent, and that task performances exhibit similarities. Recurrent information processing tasks that characterize crisis phases may be developed in greater detail.

**Figure 11.**  
**GENERIC CLASSIFICATIONS OF TASKS RELEVANT**  
**TO THE OPERATION OF THE CAM**

Functions Performed		Generic Classification of Tasks			
		<i>Information Sensing/ Acceptance</i>	<i>Information Assess- ment/Synthesis</i>	<i>Information interpreta- tion/diagnosis/decision- making</i>	<i>Preparation and trans- mission of messages and reports</i>
Phase I	(1) Problem Recognition and Reporting	X	X	X	X
	(2) Alerting Senior Officials to the Problem	X	X	X	X
	(3) Problem Review and Assessment at the Senior Official Level		X	X	X
Phase II	(4) Warning Appropriate Military Commanders, Agencies and Services of the Situation	X	X	X	X
	(5) Course of Action Planning and Recommendation	X	X	X	X
	(6) JCS/NCA Course of Action Approval		X	X	X
	(7) Military Action Execution Planning		X	X	X
Phase III	(8) The Decision to Execute Military Action		X	X	X
	(9) The Commitment of Military Forces			X	X
	(10) Situation Monitoring After Commitment of Military Forces	X	X	X	X



### Information Sensing/Acceptance

This task involves the collection of information, ascertaining the reliability of sources, and ascertaining the validity, completeness, and accuracy of the reported information. In a large information handling structure, information inputs may be derived from a welter of sources that include, but are not limited to, personnel contacts, reports from allies, sensor indications, visual and electronic reconnaissance, etc. In day-to-day operations, routinely reported information is normally collected and stored, using institutionalized procedures and schedules, for specific uses. This basically involves monitoring military/political/economic activities with regard to a set of pre-defined dimensions and comparing the activities monitored with those regarded to be normal and usual. An activity that exceeds limits regarded as usual or normal is a signal for increased alertness.

### Information Integration/Synthesis

This task involves the extraction, reduction and integration of relevant bits and pieces of information to satisfy a particular information requirement. The extraction of relevant information involves to some degree subjective judgments. Here, the question of relevance is central—"relevant to what?" This in turn requires formulation of more general hypotheses about the situation and the probable intents of an adversary. Alternative hypotheses may then be tested against fragments of incoming information. Without such hypotheses, signals which—after the event—seem blatantly obvious may well go undetected in an always noisy background.

Still, the task is difficult. There will usually be redundancies, i.e., the same information may be derived from different sources. Information obtained from different sources, or that obtained over time from the same source may not agree. Such conflicts may either reflect *disinformation*, i.e., a ruse implemented by an adversary, or, seeming conflicts may merely indicate that the situation is dynamic. As relevant information is extracted and clustered, detailed hypotheses are formulated as to the major parameters and aspects of the situation. This often leads to the formulation of further information requirements and queries of short and/or long term information/ data storage to obtain a fuller picture of the situation history. It may also lead to a shift in judgments in regard to what information is relevant.

### **Information Interpretation/Diagnosis/ Decision-Making**

This task involves three classes of decisions. First, given the synthesis of information described in the preceding paragraph, what is the situation? Information inputs describing situation parameters are compared with information obtained from long term and short term history. From this, decision-makers identify situations or states that might exist, and indicate which of these is most probable. In fast breaking crises, it may not be possible to identify one construction of the situation as true and clearly eliminate all others. If there are substantial doubts, estimates as to the degree of uncertainty of the diagnosis should be noted. Decisions of this class are common to the CAS Phase I activities.

Second, given a firm (or tentative) diagnosis of the situation, what diplomatic and military alternatives are available? Course of action selection involves:

- formulation of alternative courses of action;
- formulation of appropriate criteria for evaluation of alternatives;
- assignment of weights to criteria; and
- assessment of alternatives against the criteria.

Ideally, these subtasks are performed iteratively, i.e., gross solution concepts are screened by broadly defined criteria to identify a best class of solutions, and a solution from this class is selected and refined. Decisions of this class are common the the CAS Phase II activities.

The third class of decisions are those decisions common to the CAS Phase III activities. This class of decisions involves decisions as to a) definition of military missions, b) whether military actions, once initiated, are going in accordance with the operation plan, and c) whether the military actions appear to be achieving the NCA-established objectives.

### **The Preparation and Transmission of Reports and Messages**

This task involves three basic sub-tasks:

- Reports should be prepared (or verbal reports given) which clearly and factually convey the communicator's intended message. Standard formats that are compatible with EDP procedures are frequently used for information that is routinely reported; however, during a crisis situation, many communications will of necessity, involve information that is not routinely reported.
- The communicator establishes the priority designator, classification, etc., that he puts on the message or communication.
- Communication transmission, i.e., using the physical system (hardware) to transfer a message between *geographically separate points*. It may involve the use of secure voice transmissions equipment for oral messages or the use of cypher equipment for electronic printed and facsimile messages.

## Chapter IV

### NON-IDEAL ORGANIZATIONAL BEHAVIORS IN DECISION-MAKING

The operational cycle of the Crisis Action System described in Chapter III depicts crisis decision-making in a formal sense—the so-called *rational model* of decision-making. It depicts the many segments of the various governmental agencies involved as acting in a monolithic, unitary way as might be expected of an individual rational decision-maker. Thus, the CAS *examines goals, defines options, traces out the consequences of each and chooses that option or course of action which optimizes expected future values.* The CAS is depicted as an ideal decision-making apparatus; however, numerous accounts of U.S. responses to crisis-precipitating events in the past as well as other organizational behavior studies, suggest that organizations, when confronted with a decision problem, do not always act in the way that the ideal model infers they do or should. As Dr. Marion Levy has pointed out,<sup>14</sup> no person or organization consistently makes decisions in complete conformity with ideal value sets. There will almost always be discrepancies.

Granting this, frequent deviations from the ideal model should suggest problems that can be reasonably expected when organizational attempt to prepare for and cope with crises. The question is not really one of whether the behavior of organizations deviates from an ideal norm, but rather one of to what extent the deviations are *non-random*, hence predictable, and *non-trivial*. To the extent that certain propensities to deviate from the ideal norm are similar in dynamics and have a significant probability of occurring, it may be possible to impose compensating remedies upon the operation of the decision-making apparatus.

The Chapter III description of the CAS operation—the script for the training film—corresponds very nearly to an ideal model which Allison<sup>15</sup> refers to as Model I. Cyert and March<sup>16</sup>

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<sup>14</sup>Seminar to Military Assistance Officers' Course, Fort Bragg, N.C., October 1969.

<sup>15</sup>Graham Allison, *Essence of Decision*. Explaining the Cuban Missile Crisis. Boston, Mass: Little, Brown, and Company, 1971. Page 256.

<sup>16</sup>Richard G. Cyert and James G. March, *A Behavioral Theory of the Firm*. Englewood Cliffs, N.J.: Prentice-Hall, Inc. 1963.



developed two additional perspectives of organizational decision-making, which Allison calls Models II and III. Sufficient episodic evidence can be cited to suggest that these deviates from "rational" decision-making can have real world counterparts. Models II and III are described next with examples cited in footnotes.

#### **Model II—Organizational Inertia/Momentum**

Model II may be characterized as that of *organizational inertia*, or *insensitivity and slowness to accept, and deal, with change*. According to this model, the organization is characterized by a limited number of action repertoires. Each repertoire consists of programs and routines, which at any given point in time are relatively fixed. These repertoires serve to direct and coordinate the activities of the organization components. Organization modes of operation change slowly and by minor increments. In Allison's terms, we can best predict the behavior of an organization at time  $t$  by observing what it was doing at  $t-1$ . The change, if any, will have been small. If this is true—and it may or may not be true—hypotheses can be established as to what an affected agency would do when confronted with indications of (probable) crises. First, one would expect the transition from day-to-day to crisis operations to be difficult, particularly for civilian agencies not accustomed to slipping into a crisis armentarium with the sound of the bugle. The military, State Department, and intelligence agencies can be expected to have procedures and categories for use in the situation diagnosis phase for classifying and processing crisis-related information, and for filtering the information accepted. One would look for difficulties in accepting information of dubious reliability that does not fit into these categories.<sup>17</sup> One might expect the organization to have difficulty in accepting information that

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<sup>17</sup>An illustration may be drawn from the first TET offensive in Vietnam—not only a crisis for our forces there, but a crisis in contributing to some loss of faith in the military by the American public. Organic to COMUS MAC-V, which directed operations, was its J-2 intelligence staff, armed with many sophisticated computer banks. Given a clearance and legitimate purpose you could query the bank and obtain loads of assorted information. Some 300 miles north of Saigon, in a village 20 miles SSE of Hue, was Sgt. Calvin D. Brown, U.S.M.C., with his Marine squad, which together with a Vietnamese platoon, formed a Combined Action Team (CAP) for village defense. Sgt. Brown also had an intelligence system. It consisted in part of buffalo boy outriders—unarmed youngsters ages 10 to 12 who took the buffalo out from the village to graze. From his buffalo boys and villagers, Sgt. Brown got the word that VC units were moving North to attack Hue, some 48 hours in advance. While General Westmoreland and the J-2 computers had some advance indications of VC/NVA attacks, General Westmoreland's account suggests that MAC-V had little or no advance warning of the scope of the offensive, and 24 hours advance warning of its timing at best.

Had MAC-V had definitive 48 hours of warning, and a better appreciation of the scope of the offensive, the outcome would undoubtedly have been much more successful. In retrospect, it is clear there are enormous problems in getting an information system, which is programmed for *hard* military intelligence, to accept, process and properly weigh information of the sort Combined Action Teams could provide. (Westmoreland, *A Soldier Reports*, Chapter 17, "The Tet Offensive." Interviews by the Senior Writer with Sgt. Brown.)

has no obvious relationships to options within its action repertoire. Or, a charismatic field commander might think himself the best judge of what information should go to the NCA.<sup>18</sup> The slowness of individuals to come to grips with information which suggests that the situation has changed and their reluctance to search for new and different solutions has long been recognized.<sup>19</sup> The same propensities appear to hold when they occupy positions in organizations.

Rigidity in sticking to an organizational repertoire—a possible handicap in situation diagnosis/threat assessment—may carry over to execution planning. A likely problem could be that of modifying an OPLAN to fit a particular political option as defined by the NCA. In the Cuban Missile Crisis, it appears that some time was required to recognize that an Air Force OPLAN did not satisfy the requirements for an NCA defined surgical strike that was to be confined to the missile sites.<sup>20</sup> Further, in time sensitive situations, it may be very tempting to select a carefully worked out OPLAN even though the plan does not clearly fit the political objective, rather than develop a completely new OPLAN.<sup>21</sup>

### Model III—Competition Between Agencies

Model III described by Allison and in greater detail by Cyert and March develops another aspect of organizational functioning. Here, the focus is on inter- and intra-agency interactions, rather than on the interactions between agencies and external environment as described in Model II. This model views the several government agencies as members of a coalition competing to serve national needs. Some U.S. objectives are the clear responsibility of one agency.

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<sup>18</sup> According to then Captain Norman J. Ward, G-2 Section, EUSAK, during the Korean War, General Douglas MacArthur became irate when he learned that a report to him on the capture of the first soldier from a Chinese Army unit in Korea had also been relayed by an intelligence unit directly to the Pentagon.

<sup>19</sup> W.S. Vaughan, Jr., and Anne Schumacher Mavor. "Behavioural Characteristics of Men in the Performance of Some Decision-Making Task Components," in *Ergonomics*, 15, No. 3, 1972, 267-277.

<sup>20</sup> Graham Allison, *The Essence of Decision*. Explaining the Cuban Missile Crisis. Boston, Mass.: Little, Brown, and Company, 1971. Pages 124, 125.

<sup>21</sup> The main German attack on France (rather than on Russia) in World War I illustrates the influence that plans, once made, can have on politico-military strategy. Moltke, the nephew, prompted by his Uncle's strategy, had spent years planning an attack on France. His staff had confirmed a core element of plans—mobility by rail—in annual maneuvers. The German Army was mobilized in late July. As political events broke and the moment of decision approached, the Kaiser felt that he could attack Russia, avoiding (or at least delaying) a two-front war. He said to Moltke, his Chief of Staff, "Now we can go to war against Russia only. We simply march the whole of our Army to the East." Aghast at the thought of his marvelous machinery of mobilization wrenched in reverse, Moltke said, "Your Majesty, it cannot be done. The deployment of millions cannot be improvised—if we try ours will not be an Army ready for battle but a disorganized mob of Armed men with no arrangements for supply. Those arrangements took a whole year of intricate labor to complete . . . (they) cannot be altered." "Your Uncle would have given me a different answer," the Kaiser said . . . and later, "Now you can do what you like." Moltke gave the order for attack and the world was never the same thereafter. (From Barbara Tuchman, *The Guns of August*, pages 78-82.)

Others seem to "fall between the cracks," i.e., no agency is specifically responsible—or different agencies are responsible for different aspects of an area. When government agencies act in series—i.e., during non-crisis times—it is not uncommon for them to compete—to establish adversary relationships—for a share in missions.<sup>22</sup> This competition to serve the national weal can, however, have adverse side effects. During non-crisis operations when government agencies are acting "in series," it can result in failure to establish commonly agreed-to responsibilities, authority structures and procedures for use in the time constrained crisis environment. It can also create inter-agency and inter-personal animosities. Hopefully, these will be forgotten if the bell rings and national interests are in jeopardy, but this is not assured.<sup>23</sup>

Cyert and March's development of the Model III concept applies both to inter- and intra-agency operations. Referring to decision-making at higher levels of organization, "decisions peculiar to individual sub-units are held separate. Top management focuses *sequentially* on decision issues raised by sub-units. Complex problems are fragmented into separate components, and procedures at the upper levels preserve the fragmentation. The problem of rationalizing objectives of different individuals (units) involved is solved by coping behavior—essentially by leaving conflict unresolved. Most of the time, organizations exist with substantial latent conflicts between goals." Model II factors that can distort reporting upward can be reinforced by competition among organizations as described by Model III. This is especially true in the reporting of "facts" that cannot be completely explained by resorting to hard physical measures. Successive screenings do (or can) occur in multi-echelon organizations as information is reported upward. Each level may filter information, deciding in some degree what is and is not worthy of reporting, and suggesting ways in which reported information should be interpreted. The cumulative effect of exercise of these successive filters can result in the NCA receiving status reports that knowledgeable observers on the scene would hardly recognize.

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<sup>22</sup>As one classic case, at a critical time prior to the Cuban Missile Crisis, U-2 aircraft were not flown because of interagency conflicts. Air Force wanted to fly the mission over Northwest Cuba in view of its basic mission; CIA wanted its pilots to fly the mission because the purpose of the mission was to gather intelligence. State did not want anybody to fly the mission because of possible international repercussions if another U-2 got shot down as had happened with a Chinese Nationalist U-2, over China a few days before. Thus, in a very time-sensitive period, weeks went by without the mission being flown.

<sup>23</sup>Conflicts between field commanders sharing the same formal allegiances have been numerous. The Confederacy was in trouble from its inception, but Lee's Lieutenants sometimes failed to coordinate. McClelland did not choose to assist Pope at the Second Battle of Manassas. (From Shelby Foote, *The Civil War, Volume I*.) Of allies, Napoleon said, "I'd rather fight than join them."



### **"Putting It All Together"**

As the current CAS evolves, one can only guess what past errors might be repeated—errors that can suggest guidance/cautions for the future. As a cautionary note, the writers question whether problems similar to those encountered with anticipation of the attack on Pearl Harbor and the Bay of Pigs operations have been clearly eliminated. In neither case did the then existing CAS perform like Model I. With regard to Pearl Harbor, information suggesting a very high probability of a Japanese attack at some place or places in the Pacific was abundantly available to the system from MAGIC and other sources; however, it was not assembled by one full-time cross-agency group with cognizance over both military and political intelligence and with the responsibility for advising the President as he made his situation diagnosis decisions. Regarding the Bay of Pigs, as a result of its several modifications, the plan that was eventually implemented had next to no chance of success. The inexperience of the new administration has been offered as an excuse for the lack of success; however, it appears that no group of stature acting in the national interest (rather than in the parochial interest of an advocate) had the full time responsibility and authority for carefully analyzing the assumptions underlying the plan, its military feasibility, the political constraints President Kennedy would impose, and projecting probable events subsequent to the planned landing, forward for some weeks. Yet the preponderance of information needed to do this was within the "system" of U.S. agencies. The problem, again, was to bring assumptions, and information, together in realistic forecasts.

### **Summary**

The delineation of the CAS operational phases and functions which are compatible with the Model I concept provides basic standards as to how the crisis decision-making apparatus should ideally behave. The Models II and III concepts suggest a need to investigate non-ideal behaviors of the crisis decision-making apparatus. It would be most difficult to determine to what extent Models II and III reflect reality; however, enough incidents can be accumulated to suggest that deviations from the ideal are *more* than highly unlikely one-time occurrences. The Models II and III concepts, in addition to revealing a potential need for investigation, also provide clues as to areas of emphasis.



As examples:

- The existence of organizational inertia suggests simulations that would stress the ability of the CAS to change plans in response to inputs confirming a major change in situation.
- The potential for interagency competition and the fact that relevant information may be scattered in several agencies would place emphasis on simulations requiring cooperative problem solving among interagency groups with requisite agreements as to authority relationships.
- These models suggest that field CPX exercises or field maneuvers be tied in with crisis simulations occasionally. This would help to assure that readiness reported when the system is in series coincides with readiness reports by the parallel structure used during crises.

## Chapter V

### SIMULATION OF A CRISIS ACTION SYSTEM

Chapters II through IV serve as a background for the next three chapters. This chapter provides a transition from operations of the CAS in response to a "real" crisis, to simulation of crisis operations in order to examine ways in which timeliness and quality of system response can be improved. It describes concepts and guides basic to the planning and conduct of simulations.

#### Simulation Defined

Simulation may be defined in several ways. Broadly speaking, it involves the manipulation of a system, sub-system, or an operating model thereof, to examine those *managerial and system action processes* by which the system performs its intended function. In the case of the CAS, the system action processes involve basically man, equipment and man-equipment information handling and decision-making. In simulation, the CAS is manipulated by presenting its elements or sub-elements with a constructed (hence feigned) *account* of a crisis situation in order to examine managerial or system action processes. The *account* consists of information inputs that may be presented verbally, by alphanumerics, by graphics, and/or by permanent sensor records. The simulation may involve actual elements and sub-elements of the CAS or representations thereof. Responding elements and sub-elements of the CAS, whether actual or representations, may reflect one or more levels of the command hierarchy. The simulation program *exercises* the managerial and system action processes of various elements or sub-elements of the CAS by requiring them to perform their crisis-related functions. Participants may be those actual individuals who make up the personnel complement of the CAS, or they may be subjects who assume the role of individuals of the actual personnel complement. Or, as we proceed further from real world actors to simulations thereof, information inputs may act upon algorithms or stochastic processes which have been selected to model operations of system elements. And, along this hypothetical continuum extending from actual operators to mathematical abstractions, there are in concept, at least, many way stations. During simulations, the managerial and

system action processes are observed and data are collected to permit assessment in keeping with the simulation purpose(s). Finally, simulations are not answers; they represent systematic means for *exploring alternatives* in the search for answers to the design of systems and their modes of operations.

### Simulation Purposes

The CAS incorporates a C<sup>3</sup> system which is a complex of people who are linked by various types of communications hardware, and who process information inputs, usually in conjunction with stored information, for specific purposes. The CAS elements and sub-elements are highly interactive throughout the C<sup>3</sup> system. The *quality* of the CAS's performance is determined by a host of factors that include the training, experience and capabilities of managers and operators of the system, the inter- and intra-organization structures and authority relationships of the CAS's elements and sub-elements; the clarity of instructions and procedures for the system action processes; communication equipment and procedures; the accessibility of stored information; etc.; etc. Because of the complexity of the CAS, its C<sup>3</sup> system, and the necessary continuous interactions among its elements and sub-elements, it is often difficult to ascertain just which of the CAS's features, characteristics, or aspects of its operation led to a recorded level of performance. Insights into the cause-effect relationships that lead to particular levels of performance are prerequisites to improvement of the effectiveness of the CAS. Simulation as a management and research tool can be used to gain a better understanding of such cause-effect relationships. Simulation exercises may be conducted to:

1. indoctrinate/train participants in system action processes and procedures.
2. check out existing or proposed managerial and system action processes and procedures, authority relationships, communications procedures and equipment, etc., for efficiency and/or workability.
3. define and explore politico-military options that might be exercised in response to external threats and where such options might lead.
4. develop information, techniques and procedures that can be used to:

- a. identify and configure the elements and sub-elements of the CAM as appropriate for specific crisis situations.
- b. evaluate alternative forms of element and sub-element organization, structures, authority relationships, managerial and system action processes, and process aids such as computers, data display equipment, etc.

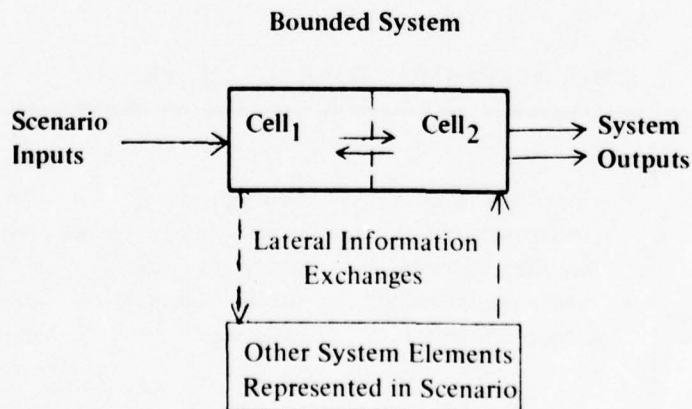
The principal focus of this report is on the fourth purpose.

### Simulation Structure

Two prerequisites must be satisfied in planning any simulation exercise:

- The purpose or objective(s) of the exercise must be thoughtfully worked out and clearly stated; and
- those elements and sub-elements of the CAS that are to be the focus of interest must be identified and demarcated.

In this report we refer to the elements of interest—whether major sub-systems, or a microscopic system component—as the bounded system, or bounded element. Sub-systems or sub-elements within the bounded system are referred to as cells. The boundary encloses those elements whose performance is of concern for the particular study. Scenario inputs provide the bounded system the opportunity and the freedom to exercise its options in the performance of its assigned functions. Other components which interface with the bounded system may be played or simulated, to provide realism and as sources of scenario inputs.





The data obtained from simulation describe performance of the bounded system; the purpose of simulation is typically to improve its performance.

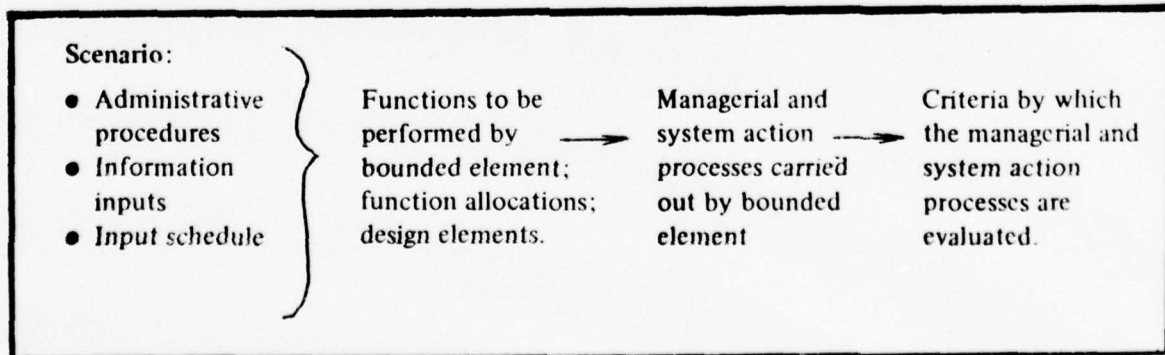
Simulation may take a variety of forms. Central to any of these is a basic structure consisting of four interrelated elements:

- scenarios—i.e., the account and information input schedule;
- the functions to be performed by the bounded elements, i.e., design features.
- the managerial and system action processes carried out by the elements and sub-elements of the CAS as the functions are performed, and
- criteria by which the managerial and system action processes are appraised or evaluated.

Within the simulation structure shown above, either the functions to be performed by the bounded element, or the managerial system action processes may be treated as the causal or independent variables. These variables are regarded as causal in that they account for the levels of performance measured by criteria or dependent variables. Early on in system design, simulation may be used to determine how system functions are to be allocated and/or to investigate the merits of various structural relationships. Later, once functions have been reasonably well-established, interest may center on action processes. In either case, the basic simulation structure can be represented schematically as a temporal (and presumed causal) ordering of events that go from left to right as indicated by Figure 12.

**Figure 12.**

#### **SIMULATION STRUCTURE SCHEMATIC**



In construction of a simulation exercise, the close interdependencies between the various elements of the *simulation structure* must be recognized. The processes and activities of the bounded element are central. But the occasion for their occurrence depends on the proper play and timing of scenario inputs. Similarly, application of criteria is predicated on, hence must be compatible with, activities to be performed. Thus, in a well-executed simulation, all elements of the structure merge into an harmonious whole. Elements of the *simulation structure* and their features are described in summary form below.

### **Scenario**

The scenario is the program of information that will be provided to the bounded system. The scenario (and the doctrinal mission/function(s) of the bounded element) determine what functions should be performed in what order. Successive events described by the scenario may or may not be modified administratively, depending on the manner in which the tasks are performed by the action element. Thus, scenario inputs may be interactive or non-interactive.

The input program must call for functions and managerial and system action processes that are compatible with the mission and responsibilities of the bounded system under study. The managerial and system action processes may be made more or less difficult to perform by:

- varying the clarity and reliability of reports.
- providing as inputs messages that conflict.
- providing information that is redundant, incomplete, or irrelevant, and which must be recognized as such.
- providing successive items which are related, but in ways that are not immediately apparent, and whose relation must be established by the bounded element.
- increasing the rate at which inputs are provided for processing, and/or their priorities.

### **Functions to be Performed by the Bounded Element**

The various elements and sub-elements of the CAS may serve as *information providers*, *decision-makers*, or *action-takers* during a crisis situation. Which function or functions are performed

by a particular sub-element or element of the CAS depends, to some extent, upon the specific crisis situation; however, some elements or sub-elements because of their official responsibilities, may always perform certain functions regardless of the crisis situation. In a simulation exercise, the functions performed by the involved *bounded element* are determined by its official responsibilities, and its interpretation of these in response to scenario inputs.

### **Managerial and System Action Processes**

The managerial and system action processes carried out during a simulation exercise derive from the extant definition of the roles and duties of the bounded element. These processes, which may or may not make use of process aids such as computers, data display equipment, pre-formatted messages, pre-established communication procedures, pre-determined courses of action, etc., are the independent variables which account for the bounded element's level of performance.

### **Measures and Criteria**

Crucial to the development of simulations is the establishment of measures of performance. This is typically a two-step process. First, we determine what to measure; second, we make explicit the norms or standards against which measured activities are to be compared. Relevant system behaviors—i.e., performances to be measured—are identified directly from the purposes of the simulation. Early on in system design, no acceptable performance norms may exist. Here, information may be developed from studies of prior crises, and deductive analyses which indicate that certain activities must be performed within specifiable time bounds. As system development (or retrofit) proceeds, data bases should evolve to indicate what levels of performance are acceptable. The loop is closed by comparing obtained data with the pre-established norms or standards.

Criterion data may be collected by observing the bounded element in action (process criteria) and by analyzing its output, i.e., reports made, decisions made, or actions taken (product criteria). Generic criteria such as time, quality and sufficiency must be translated into specifics. Examples might include the workability of pre-established communications procedures; the ability of the bounded element to change activities in response to high priority messages indicating the need; the ability of the bounded element to sense the (true) interrelationships

of information inputs, dribbling in over time, and *not* precoded under a common concept; its ability to quickly retrieve relevant stored information, etc. The specific form of the criteria will depend in part on the size of the bounded element involved and the purpose of the simulation. If the bounds are broad, i.e., several elements of the CAS must operate in unison to make up the system, the criteria might encompass an integrated report, the time to accomplish all aspects of a planning operation, etc. If the bounds are narrow, simulation might be analogous to an engineering test that confirms or rejects the workability, efficiency, or effectiveness of a device or system component. A system element might also be examined by an experimental test of two or more devices which perform the same basic function, in order to determine which device operates best as measured by criteria.

#### Criterion Data Collection

It is not the purpose of this chapter to provide how-to-do-it prescriptions. However, it is impossible to overemphasize that the value of any simulation will depend in substantial part on the care and preplanning for collection of criterion measures. With present recording equipment, one can literally record on time lines everything that every simulation subject says or does—more information than a host of data clerks can **ever** fully analyze. Careful planning should focus on data and information that are most relevant.

Sources will depend on the type of simulation. Possible sources/observations include:

- all messages—content; addresses; precedence; time of dispatch; receipt; transmission times; processing times; etc.;
- situation charts; charts/descriptions of developing action plans;
- misinterpretations; errors as messages flow through channels;
- extent to which existing procedures are followed; establishment/announcement of new procedures as needed;
- sufficiency of reports;



- ability of subjects to modify plan, directions, redirect effort in a timely manner consistent with changing events described in scenario;
- qualitative post-exercise reports, evaluations by observers; and
- qualitative post-exercise reports by participants.

#### **Data Analysis/Interpretation**

Data analysis involves relating criterion measures to the managerial and system action processes that are accomplished to perform the functions dictated by the scenario.

#### **Five Forms of Simulation**

Simulation can address many questions individually or in clusters that bear on design and redesign of C<sup>3</sup> systems for better performance. The basic structure of simulation may take many forms. Five variations or forms of simulation are:

1. **Operational exercises.** Operational exercises are typically large scale; they simulate units from several agencies that would be involved in the event of crisis. They can be used to obtain gross data on system response times—data which cannot be readily obtained in any other manner. Well-planned collection of observations by observers and participants can be very useful in helping to identify problem areas. Because of system interactions, it is sometimes difficult to trace a particular effect—desirable or undesirable—to a particular cause.
2. **Proof of concept; procedures.** This sort of simulation is typically used to check out a new system: procedure; display; interagency communication arrangement; etc. Application of well thought out criteria can provide very useful system performance measures. If performance data are available on prior versions of the bounded element, performance improvements reasonably to be expected can be evaluated.

3. **Experimental evaluations.** Experimental evaluations are typically small scale. They involve comparison of two or more managerial arrangements, sets of procedures, algorithms, or displays to evaluate their relative merits. In concept, the method has substantial advantages; it permits objective observations, hence data relatively uncontaminated by subjective opinion or self-serving bias. With a sufficient number of replications, it can provide stable data for comparison of alternatives.

It is often difficult to exploit this potential in practice. For example, we might like to plan to conduct an experiment using elements of the actual C<sup>3</sup> system and manager(s) to evaluate alternatives, only to find that (a) the alternatives could not be readily or credibly fit into the existing system configuration, and (b) extra trained personnel with security clearances are unavailable. If the experiment is performed off-line, question always arises as to whether findings will hold up in the real world system. Still another problem: the number of knowledgeable subjects available for simulation is limited. When the *same* subjects are used to try out different experimental versions, they learn. The relative merits of system variants are thus confounded with learning in amounts that are not readily determinable without additional time, subjects, data collection runs, etc. These problems are all soluble; in practice, they are often not easily soluble.

4. **Talk through; system inspection.** Initial studies of system design often involve no more than a "talk through" of the system operations through one or more phases. Talk throughs can be used to define branchings in policy and action alternatives, to discover problem areas, to establish operating procedures, to train managers, etc., etc. The amount of effort allocated, and the foci of effort can be adjusted to fit the situation.

System inspection, as the term is used here, involves merely making checks to determine whether provisions are available for various activities and conduct of procedures and tasks, required for timely and effective system operation. As examples, these could include review of pre-established switching arrangements for interconnecting several terminals,<sup>24</sup> review of notification lists, pre-formatted messages, etc., to determine their availability, and to estimate their adequacy. A handy tool in conjunction with planning operational simulations in large scale systems.

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<sup>24</sup>By T.G. Belden's account (1969), excessively complex.

5. **Mathematical and computer simulation model.** Mathematical and computer simulation models permit symbolic exercise of the bounded system according to pre-established instructions. Decision nexuses, with their rules, information channels and routing schemas, represent the system structure. The scenario consists of information inputs to be fed into the system on a schedule. Algorithms and/or stochastic processes are incorporated into the various decision nexuses to represent information, acceptance and responses. These are in turn directed through channels to other decision nexuses for processing. System outputs consist of messages/directions at the interface between the bounded element and (assumed) downstream managers/operators. The algorithms or stochastic processes incorporated into the models may take forms such as:

- a. distribution of times to process messages by message class/priority under varying communication traffic loads.
- b. probabilities that relevant classes of items will be requested from storage; probability that if requested, they will be found; assumed distribution of search times.
- c. distribution of times required to interconnect 3, 4, 5, 6 terminals for conferencing.
- d. probability that interterminal messages will be understood and properly interpreted.
- e. probabilities that each of the changes needed in an available OPLAN will be detected and made.

Systems may be simulated in greater or lesser detail; simulations may employ managers/operators and algorithms in various proportions. Depending on their complexity, math simulations may be time-consuming to construct and check out. Their great advantage over other forms of simulation is the speed and efficiency with which they can be used to generate data. However, use of math models always raises question as to the representativeness and validity of the assumptions/data that make up the model.

### **System Versatility**

We have not yet raised the possibility of interactions between different crisis types and different configurations of variables that describe the system or bounded element. Some system configurations/procedures may well be effective for certain types of crises:

others for other types. The publication by Druzhinin and Kontorov claims interactions between types of problems and the effectiveness of group organizations designed to solve these problems.<sup>25</sup> The need to develop systems that can handle different types of crises has implications for the role of simulation in system design. Prototypes of bounded elements should demonstrate in simulation the ability to handle *several different types of crises* before system designers given them their full stamp of approval.

### Summary

The preceding pages have described simulation and its purposes, and developed a generic structure of simulation. Five types of applications have been described. Advantages and disadvantages of each are summarized in the table following. All simulations described in the next chapter fall under one or more of these types.

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<sup>25</sup>V. V. Druzhinin and D.S. Kontorov. *Concept, Algorithm, and Decision*. The United States Air Force, 1972.



Figure 13.  
TYPES OF SIMULATION AND THEIR  
CHARACTERISTICS

Relevant Characteristics of Simulation	Operational Exercises	Proof of Concept; Procedures	Experimental Evaluation	Talk-Through	Mathematical/Computer Simulation
Scope/Size Bounded Element	Often broad in scope	Can be any size; often small	Moderate to small in size	Any scale	Any scale
Establishment of cause-effect relationships	Episodic. Difficult to forecast from episodes.	For that test only	Best for objective assessment of limited number of variables	Can establish hypothesis as to causal relationships, causal agents	Depends entirely on validity of algorithms, data assumptions
Level of effort required to plan, conduct	Function of scope and scale of exercise	Depends on scope/size of bounded element	Moderate	Small effort, but highly qualified managers required.	Substantial; can be very great depending on size of bounded element, level of detail modeled.
Probable validity of findings	Most valid next to performance under crisis conditions.	Valid for acceptability tests	Valid for experimental setting; must be generalized, however.	Must be determined empirically	See causality establishment
Precision of findings	Varies because of interactions among elements.	Reasonably precise depending on thoroughness.	Most precise	Imprecise	Exact for deterministic equation; distributions for stochastic processes.
Data Analysis Effort	Can be extensive if desired	Substantial	Smallish	Simple summaries or none	Moderate to small
Can replicate to obtain comparable statistical bases	Cannot readily be done under same conditions	Barely possible, typically not done	Readily with small bounded elements	Can repeat; will not normally obtain statistical data	Very easily

## **Chapter VI**

### **CRITERIA RELEVANT TO CRISIS ACTION SYSTEM PERFORMANCE**

Chapter III developed functions of the Crisis Action System in three phases. All functions involve essentially the handling of information—information channeled into the system via verbal reports, taped messages, computer readouts, graphics, sensor indications, etc. Chapter V indicated how similar information can be constructed—simulated—in exercises conducted during non-crisis times to train personnel and/or to examine and improve design and operations of the system.

Essential to the conduct of simulations is the use of criteria to measure the effectiveness with which functions and managerial actions are performed. Many criteria could be applied to the beehive of activities that crises and crisis scenarios can set into motion. From these, we have selected for discussion criteria that satisfy several desiderata.

1. Criteria are to focus on the aspects of crisis management which prior crisis experience and analysis of the operations of the system indicate are difficult to solve.
2. Criteria will focus primarily on data processing characteristics of Phases I (Problem Recognition and Assessment) and III (Execution of Military Actions) of crisis operations. Minimal attention is given to formulating criteria relevant to activities and functions of the NCA.
3. The criteria are to be generalizable across agencies and across crisis situations.
4. The criteria are not to be limited in application to specific existing systems hardware or procedures (most will be classified), but are to be broadly stated, and thus relevant in a longer time frame.
5. Direct measures of time to accomplish tasks, which are accepted as criteria, will receive little mention.

## Criterion Perspectives

Four sets of criteria have been generated which satisfy the desiderata listed on the prior page.

- A. **System or Whole System Criteria.** These criteria would be applied during operational exercises. See Chapter V, pages 56, 60. Concern is with coordination of components (i.e., sub-elements and elements) of the CAS that are interconnected and that need to work closely together in the event of crisis.
- B. **System Configuration or Organizational Criteria.** Concern is with the effectiveness of different organizational arrangements, structures and configurations of system components, i.e., the sub-elements and elements of the CAS. Different component organizations, structures, and configurations may require different procedures within and between components for effective transmission and processing of information. The effectiveness of organizational structures may be observed in operational exercises. Alternately, simplified versions of organizational arrangements of special interest may be studied in experimental evaluations.
- C. **Information Processing Criteria.** Emphasis is on the effectiveness of the sub-elements and elements of the CAS in accepting crisis situation information inputs, the integration of information in making diagnostic decisions, and the transmission of conclusions to other system components. These are essentially the recurring operations described in Chapter III, pages 39-42.
- D. **Man-Machine Interaction Criteria.** Emphasis is on many man-machine interactions that have been introduced by modern C<sup>3</sup> systems. Two related issues are emphasized: (a) how best to configure hardware systems and their elements for efficient and rapid use; and (b) formulation of *modus operandi* and procedures for equipment operation.

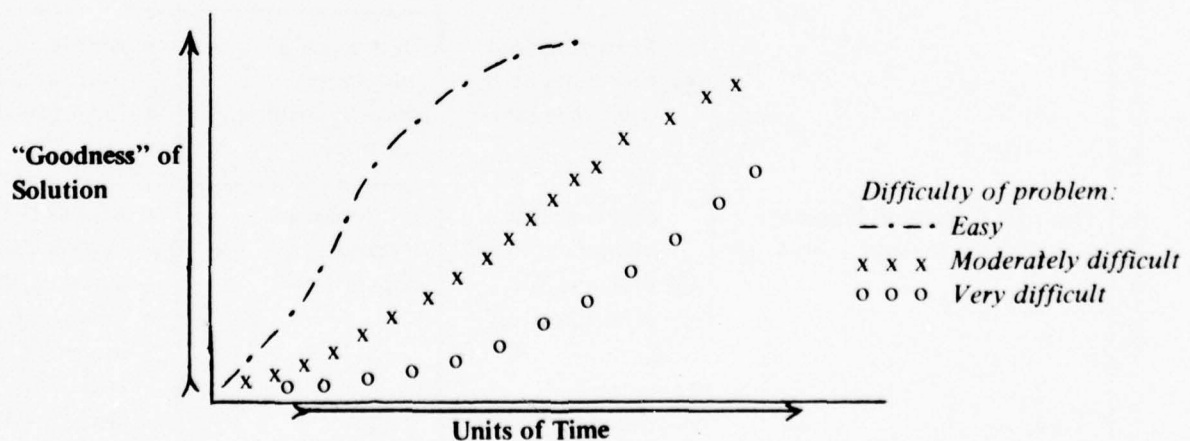
The four perspectives often imply different simulation approaches. Perspective A is clearly oriented toward operations research/systems analysis. Organizational variables (B. above) could be viewed in this manner or studied experimentally. Perspectives C and D are oriented primarily toward experimental studies. System "talk through" or inspection might well be used in conjunction with all of the above perspectives. Criteria within the four classes are not mutually exclusive; the same or similar criteria reoccur (or could be invoked) for two

or more perspectives. (An analogy might be drawn to a child's peep box with two or more viewing windows; much of the same decor is visible, but from different angles.) Figure 14, on the following page, ties together the information presented in Chapters III and V with that to be presented next. Phases in the CAS cycle are shown in the left hand column. The four criterion perspectives are summarized in the next column. The next two columns provide examples of managerial processes and tasks and criteria respectively.

### The Significance of Time; Time and Quality of Performance

The time required to accept information then decide and act is always a significant factor in the performance of  $C^3$  systems during crises. We readily accept time as a criterion. In doing so, however, the close relationships between time and quality of performance must always be kept in mind.

1. HSR's review of cases of human problem solving consistently revealed that individuals and groups are likely to develop better solutions when they are given more time to solve problems. While this finding is unsurprising, its consistency over a wide variety of experiments, operational studies and simulations, is noteworthy.<sup>26</sup> Confronted with any crisis situation, there is a tradeoff between the time available to "research" the situation and the stringent requirements for time to decide and act. Further, time required to solve problems and solution quality vary with problem level of difficulty. Relationships between these three factors can be shown as follows:



<sup>26</sup>Howard B. Shapiro, with the assistance of Marcia A. Gilbert, *Crisis Management: Psychological and Sociological Factors in Decision-making*, prepared for the Advanced Research Projects Agency, Human Resources Research Office, under Contract No. N00014-75-C-0004, March 1975.



Figure 14.

RELATIONSHIPS BETWEEN PHASES OF OPERATIONS, DUTIES AND  
CRITERIA IN CHAPTERS III, V & VI

Command/Control/Communication Systems Operations During Crisis (Chapter III)		Simulation of Command/Control/ Communication Systems, Elements (Chapters V, VI)	
Phases of Operations	Classes of Manipulada	Managerial & Operator Duties, Tasks	Criteria— Examples
<p>“Whole System” or Major Elements interlinked in simu- lated operations during Phases I, II, and III</p>	<p>System design and <i>modus operandi</i></p>	<ul style="list-style-type: none"> <li>• Managerial pre-planning</li> <li>• System activation procedures</li> <li>• Provisions for planning ahead during crisis</li> </ul>	<ul style="list-style-type: none"> <li>• Accuracy of identification of agencies to be involved</li> <li>• Adequacy of accounts to alerted officials, etc.</li> <li>• Ability to forecast accurately</li> </ul>
<p>Phase I Problem Recognition and Reporting</p>	<p>Alternative forms of organization, hierarchy arrangements</p>	<p>Selected data processing tasks</p>	<ul style="list-style-type: none"> <li>• Quality of solutions</li> <li>• Stability of arrange- ments</li> <li>• Sensitivity of solutions to key individuals</li> </ul>
	<p>Recurring data processing steps and procedures</p>	<p>Data sensing, integration, decision-making, reporting</p>	<ul style="list-style-type: none"> <li>• Ability to screen for relevance</li> <li>• Inductive ability</li> </ul>
<p>Phase III Execution Planning and Military Actions</p>	<p>Man-machine equipment inter- face; specific procedures</p>	<p>Interlinking terminals; data retrieval</p>	<ul style="list-style-type: none"> <li>• Ability to keep stations in hier- archy informed</li> <li>• Relevance of information re- trieved from storage, etc.</li> <li>• Flexibility of equipment</li> </ul>
		<p>Forecasting</p>	

Criteria appropriate to operations  
of major system elements

Criteria appropriate to experimental studies

While little mention is made of time in the examples of simulations to follow, the quality/time/difficulty level equation, depicted above, is always relevant.

2. While avoiding redundancy by repeatedly alluding to time as a criterion, managerial actions that can serve to expand time available while reducing time required to perform certain functions or tasks are surely subjects worthy of attention. In some crisis situations, steps can be taken that, in effect, buy time. This would normally be the responsibility of the NCA. At a lower level of system operations, some criteria we propose deal with time indirectly in that they refer to managerial steps designed to reduce the time needed to sense, decide, and act.
3. Time as a criterion can be expressed in a number of ways. As examples:
  - a. Time to notify, say, 90% of personnel on notification list.
  - b. Time to complete assigned tasks; to accomplish one or more specified milestones.
  - c. Time for any terminal to process and respond to a given number of messages, queries.
  - d. Time for messages/queries to pass from originator to destination through one or more intervening terminals; time as a function of message priority.
  - e. Time to resolve conflicting reports, detect/correct errors.

Thus, time criteria can focus on many different aspects of system operation. Time criteria will usually be included along with other relevant criteria in CAS simulations.

### Criteria

The next four sections describe criteria that can be used to evaluate the performance of crisis management systems, subsystems, elements. The outline below will provide forewarning of topics to follow.

**A. Systemic Criteria**

1. **Managerial Planning/Procedures for Alerting and Notification of Personnel**
2. **Implementation of Notification Procedures**
3. **Criteria Pertaining to Information Management**
4. **Political Options and the Derivation of Military Missions: An Exploratory Simulation**

**B. Organizational Criteria**

**C. Information Processing Criteria**

**D. Criteria Pertaining to Man-Machine Interactions**

1. **Teleconferencing as a System Action Process Aid**
2. **Information Processing and Decision Aids**

In general, the order of discussion of each topic follows the simulation structure described in Chapter V. However, almost every topic introduces a different perspective and simulation approaches differ as well.

The usual progression by topical areas is:

- the area; its significance.
- summary; simulation purposes.
- independent variables.
- conduct of simulation.
- criteria for use in simulation.

In particular, conduct of simulation is covered very summarily; within project funds, this area could not be covered in detail. For convenience, most of the identified criteria are stated as questions. At this broad level of approach, specific phrasing of questions is far less important than the requirement that questions bear on key performance areas.

## **Section A. Systemic Criteria**

### **Managerial Planning/Procedures for Alerting and Notification of Personnel**

Personnel in key positions of the government who would be involved in a particular crisis need to be notified quickly of the occurrence of events that may signal the occurrence of a crisis. Considerable advance planning is required both by individuals and groups that give the alert and by those groups who, when they are alerted, go into their action routines.

**Simulation purposes.** To check out alerting plans and procedures for selected sub-systems. Such "systems" will consist of those elements in the government responsible for implementing alert and notification procedures in the event of crisis.

**Conduct of simulation.** Simulation is oriented toward activities involved in situation diagnosis and threat assessment, described in Phase I of the CAS cycle in Chapter III. As background for simulation, initial messages are prepared consisting of the type of CRITIC messages that might be received in the very initial stages of a crisis. To test the alerting procedures, these should be constructed to describe different events that occur in different parts of the world. Criteria are applied by visiting agencies and groups in agencies who would normally provide alerts, and by checking the plans, checklists, files, etc., that pertain to notification. This is simulation by inspection, as described in Chapter V, page 57.

**Criteria.** The following criteria are suggested for application during interviews and visits.

1. Is there a plan for notifications?
2. Does an overall schema (wiring diagram) exist to facilitate notification and to verify what agencies/groups would be involved?
3. Are addresses and call numbers of addressees available?
4. Do addressees make a practice of keeping offices notified as to their whereabouts?
5. How recently have lists been updated?
6. How fast is the notification system scheduled to **operate**? On trial calls, what is the distribution of times to contact personnel?



7. Are roles of elements to be alerted differentiated, as between information providers and decision-makers? Are elements to be alerted familiar with these roles?
8. Are guides available for telling those notified
  - a. the types of activities that are expected of them?
  - b. their role in the authority chain? to whom they are to report?
  - c. probable sources of further information, means of access, including lateral coordination?
9. Is there a plan for the integration of the activities of the elements notified (the way it would be handled)?
10. Do those notified have a plan for augmentation of their groups? Are personnel who would augment groups identified? Are they readily available? Are knowledges/skills of augmenters compatible with knowledges/skills needed?

The above criteria would be applied by inspection. A possible exception is Item 6, which calls for contacting those to be notified to check out the system and to generate a distribution of times for those to be notified to answer the call. As is well known, notification procedures are quite well worked out and practiced in Defense and State. Because of this, simulation by inspection might more properly deal with notification when the information signalling need for an alert status enters the system through civilian agencies or sources.

### **Simulating Notification Procedures**

For this simulation, scenarios would consist of the messages that are assumed to be received in the first 1-3 hours of a crisis. A set of scenarios could be used in different simulations. Individual scenarios would consist of reports of information from different parts of the world involving different types of politico-military confrontations. Specific scenarios would be constructed so that each calls on a somewhat different alignment of groups involved in receiving and acting in the notification. The response to all scenarios over several sessions would provide indications of the versatility of the system. See pages 58, 59.

Three types of CAS sub-element and element activities would be of special interest.

1. Activities involved in *giving* the alert.
2. Activities involved in *receiving* alerting information, setting internal operations into motion.
3. Activities involved in initial coordinations of activities between alerted agencies and groups.

**Criteria.** Criteria for the above three types of activities are shown in Figure 15.

**Figure 15.**

**CRITERIA FOR SYSTEM RESPONSE TO ALERT**

<b>Elements That Give the Alert</b>	<b>Elements Accepting Alerting Information, Initiating Actions</b>	<b>Coordination of Activities; Coordination Procedures</b>
<ol style="list-style-type: none"> <li>1. a. Was alert sent to all elements that need to participate in managing the crisis?</li> <li>    b. Were elements alerted that had no role to play?</li> <li>2. Was the alert               <ol style="list-style-type: none"> <li>a. clear, understandable?</li> <li>b. adequate in coverage?</li> </ol> </li> <li>3. Was necessary background information provided to alerted elements in keeping with their roles?</li> <li>4. Was background information               <ol style="list-style-type: none"> <li>a. clear, understandable?</li> <li>b. adequate in coverage?</li> </ol> </li> <li>5. Did alerted elements initiate excessive queries tying up communications channels while trying to get oriented?</li> <li>6. Did augmentations of these groups proceed in an orderly way with deliberate haste?</li> <li>7. Were personnel who augmented groups adequately briefed? Were their work assignments clear? Did they start productive work rapidly? Were their assignments planned so that products of their work contributed effectively to the larger tasks for which their groups were responsible?</li> </ol>	<ol style="list-style-type: none"> <li>1. Average and variance of times required by alerted elements to assume alert posture and review supporting information provided.</li> <li>2. Was background information needed by elements retrieved?</li> <li>3. Did alerted elements understand               <ol style="list-style-type: none"> <li>a. their role, functions?</li> <li>b. how their responses were to be integrated with those of others?</li> </ol> </li> <li>4. Were instructions/procedures initiated in the alert appropriate? Were they followed?</li> <li>5. Were queries adequately answered?</li> </ol>	<ol style="list-style-type: none"> <li>1. Were existing procedures for tasking and reporting generally understood?</li> <li>2. Were inter- and intra-agency communication links understood?</li> <li>3. Were they implemented in a timely manner?</li> <li>4. Were they adequate?</li> <li>5. If the officially designated communicator lines were not adequate, were effective links established in a timely manner?</li> </ol>

## **Criteria Pertaining to Information Management**

**Discussion.** Information overload is indigenous to crisis management. The various agencies of government are working at their normal daily pace when reports of events signaling the onset of crises start entering the system through any of the channels described in Chapter III. A CRITIC report or OPREP-3 hits watch centers and the White House Situation Room, sometimes with no prior warning, often at early hours of the morning. "Sir, the Mayaguez has been boarded." "What's the Mayaguez?" "Sir, it's a U.S. ship. The Navy says it's not one of theirs; we haven't been able to raise anyone at the Maritime Commission yet . . . ." Such initial reports will be relayed laterally to military, intelligence and State watch centers. Because of the initial report's precedence and probable significance, a beehive of activities is set into motion. Agencies becoming alerted begin to query each other and exchange information. Data files which may or may not be designed for rapid retrieval, and which differ in organization from one agency to the next, are searched to provide context for reports of events. Thus, those who would deal with crises are both the generators and victims of mountains of information and requests. Further, the situation can become worse. A speaker at a recent NASA-held symposium<sup>27</sup> noted with pride that the bit rate of major elements of the WWMCCS is soon to be increased by several fold. Viewing this development along with numerous reports of system overload during prior crises, one wonders what will happen when the next crisis occurs.

Screening information for relevance becomes especially important.<sup>28</sup> This in turn raises question as to criteria that may be invoked in relevance screening. The objective is to provide instructions for decision-makers and reporting elements which can help to insure that information being processed is relevant and not needlessly redundant.

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<sup>27</sup>The American Astronautical Society Symposium, March 12, 1976.

<sup>28</sup>This problem has long been recognized. Managerial steps, which are addressed to other objectives as well, involve establishing skeletal groups such as the Current Operations Division in JCS, to be augmented in the event of crises (*Problems in the Use of Ad Hoc Structures in DOD Crisis Management and Implications for Change*), establishing communication procedures, preformatting messages, prescribing message length, etc., etc.

### **Considerations for Screening**

Several criteria may be invoked to evaluate the ability of man and man-machine elements to filter information. To study these in simulation, one needs to maintain the distinction between the task logic, i.e., the screening process and the evaluation logic. The evaluation logic is applied to say how well the screening task was performed.

### **Screening Tasks and Implications for Criteria**

Five considerations relevant to the construction of scenarios to evaluate screening capabilities are as follows:

1. **Relevance.** Relevance and the need to establish hypotheses to facilitate successive relevance judgments are discussed on page 40. Scenarios can be constructed to evaluate many facets of relevance screening. As examples:
  - Crisis situations are dynamic. Relevance of (some) information will shift. Scenarios can call for tasks of detecting shifts in information relevance. Criteria can measure ability to detect these shifts.
  - An event in one section of the world may trigger a response by an adversary in another. Scenarios may be constructed to evaluate the ability of networks and managers to sense that prior reports from one area take on added significance, now that a certain event has occurred in another area of the world. In such cases, relevance is not a given, but rather it emerges as patterns of interrelationships between reports are discovered.
  - The ability of simulation subjects to define relevance filters may be evaluated by observing their ability to formulate, test and refine hypotheses suggested by incoming data.
2. **What information is needed depends on what (documented) information is already available.** In almost any crisis situation, more information than needed will be available about certain aspects of the problem, while a paucity of information will be available about others. Thus, as reliable information is obtained, and as pieces of the jigsaw puzzle are filled in, priorities shift. But the status of development of the "map" being



constructed from inputs from many sources will not in all probability be known by reporting sources. Instructions are needed for screening to reduce redundancy of incoming information and to direct the search toward areas that are not yet reported, or not adequately documented.

3. **Relevance and update rate.** Combining the concept of relevance with the requirement that information only has value if it is new (or needed to confirm existing information), it follows that requirements for reports from subordinate levels should be predicated on the rate and significance of changes in the situation. The objective should be to establish guides for the reporting, and the updating of reports that are compatible with the rate at which the parameters being reported are changing, and convey these to lower level sources. Frequent reports of slow moving situations serve only to clutter reporting channels.
4. **Reference to store.** A system is needed to identify relevant information in agency stores and retrieve it rapidly. This presents special problems in that the retrieval system for day-to-day operations may not be geared to the pace or subject matter categories that would be most appropriate in the event of crises.
5. **Possible conflicts with intelligence doctrine.** Any concept that would involve screening of intelligence prior to its dispatch to a central collection point may run head on into long standing and "proven" guides for intelligence collection, which demand facts, rather than interpretations of facts, from lower echelons. Admittedly, this is a problem. But where overload is a prime concern, screening will occur in some form. For example, critical information may not make its way to the top of "in-baskets." It would seem that the central source could still maintain control by defining guides for relevance to be applied by others, rather than by its own review of individual messages.

**Crises and information management; instructions and the placement of filters.** The suggestions above may give rise to scenarios and criteria for evaluating the capabilities of groups to screen information. Crisis management at any hierarchical level involves dealing with the hour-to-hour and minute-to-minute details of the moment. In doing so, managers will generate many requests for information, but they will seldom have the time—or wish to take the time—to reflect on how the information they request is changing, nor on what classes of information

they may want next. Hence, the probable need for an information manager. The information manager's role is to anticipate information needs. He ~~does~~ not attempt to anticipate specific items, but rather to identify classes of information that will be needed next, and its descriptive parameters. In concept, information managers can influence the flow of information by:

(a) instructions to sources and information processors in the reporting chain; and (b) adjusting filters on manual processors or EDP equipment.

**Simulation.** The purpose is to develop/evaluate an adaptive system for screening information for relevance/need. It was recommended above that an information manager role be evaluated. The information manager during the course of the simulation would provide instructions for information collection to sources, and to points in the information collection chains. In addition, the information manager would impose screens or filters to avoiding overloading information centers. This system could be tried in operational exercises by using information managers at key nexuses in the system (who would perhaps literally sit across the desk from crisis managers). Criteria could be used to evaluate any feasible suggestions for reduction of overload.

**Criteria.** The following criteria may be applied at information receiving stations:

1. **Information Relevance.**
  - a. What percentage of incoming items are relevant?
 
$$\text{General Relevance Index} = \frac{\text{The Number of Relevant Items}}{\text{Total Number of Items Received}}$$

With good screening, this index should increase in value.
  - b. Are shifts in relevance recognized by changes in filter instructions?
2. **Information Theory Applications.** What percentage of incoming items provide *added* information? Incoming messages can be assigned to one of four categories.
  - A. Information is relevant but needlessly redundant in that information of documented validity is already available.
  - B. Information is not relevant.
  - C. Messages are needed to confirm existing information that is not sufficiently well-established.
  - D. Messages provide new relevant information.

The utility of incoming messages during selected time intervals of simulation can then be evaluated by the following formulae:

$$\text{Confirmatory Information} = \frac{\Sigma C}{\Sigma (A+B)}$$

$$\text{New, Relevant Information} = \frac{\Sigma D}{\Sigma (A+B)}$$

$$\text{Overall Value} = \frac{\Sigma (C+D)}{\Sigma (A+B)}$$

3. **Patterns and Relevance; Verification of Hypotheses.** Relevant information items may not necessarily by aggregation clarify rapidly the underlying structure of purposes and activities to which they refer. A screening system is best which:
  - a. most clearly suggests relevant queries of sources; and
  - b. most rapidly accumulates information confirming one hypothesis of interest while rejecting others.
 Items become more relevant by their integration into clusters.
4. **Channel load.** For selected channels, what was the:
  - a. average number of messages in queues?
  - b. average delay times between dispatch of message by originator and its receipt by addressee?
 (With effective information management, the flow of messages should remain controllable even as the crisis builds.)
5. **Number of messages processed.** The number of messages processed by selected centers can be summed as a control to permit more incisive study of the value of an information manager.
6. **Was the information manager position cost-effective?** This must be determined by study of the above criteria.

The above criteria are suggested as measures of the value of filter strategy, tactics and techniques for application at collection centers. The concept of dual roles of crisis manager and information manager could be evaluated by comparison of results of simulations in which practiced information managers are used, with results of simulations in which they are not used. The cost effectiveness of information managers could be evaluated; however, the criteria are intended to be of value whatever features of filtering are studied.

### **Political Options and the Derivation of Military Missions: An Exploratory Simulation**

Focus is on early Phase II activities—course of action planning. See Chapter III, pages 31-33. The problem confronting the NCA and the JCS is that of translating a political option in the use of the military into a mission concept and orders for conduct of the mission. In concept, options are developed first, then translated into mission instructions, i.e., missions are derived directly from option statements. In practice, the availability and location of military forces of particular types, and their capabilities may influence, and even determine, which political option is selected. All crises involve an integration of political and military considerations. It is desirable that missions and ROE be established by political and military planners in concert, each with an appreciation of the preferred courses of action and constraints imposed by the other. Here, conflicts in perspectives have been frequent.<sup>29</sup>

In looking into such conflicts, it becomes apparent that military thinking works from a coherent and clearly defined value system. Heads of state are apt to make decisions from a rather different value system, and one that has not been nearly as clearly specified. When these value systems are translated into decision rules and categorical imperatives for action, rules and action guides are often diametrically in conflict. The Cuban Missile Crisis provides examples as shown Figure 16.<sup>30</sup>

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<sup>29</sup>Field commanders understandably resent directives from NCA spokesmen to perform certain missions, which at the same time pose constraints that make mission accomplishment much more difficult. Inspection of MAC-V G-2 maps in Saigon in 1968, showing identified NVA regiments lined up along—and protected by—the Cambodian border, makes one quite sympathetic to commanders' feelings of frustration. The problem remains, however, that application of tactical doctrine by opposing sides by conventional doctrine leads each to escalate conflict to the limit of its capabilities, thus inviting the other to do likewise. In a world with both sides armed with thermonuclear arsenals, this is dangerous.

<sup>30</sup>Please note the reference above to military thinking, rather than military thinkers. During the Cuban Missile Crisis, several members of ExCom, and part—if not most—of the Senators and Congressmen the President spoke to just before his T.V. broadcast, appear to have preferred a more militant course of action than that selected.



Figure 16.

**EXAMPLES OF CONFLICTS IN POLITICAL AND  
MILITARY PERSPECTIVES: THE CUBAN MISSILE CRISIS**

Referenced Activities	Political Values; Priorities	Military Values; Action Recommendations
Choice of mission	First--Quarantine Second--Surgical strike A massive U.S. attack on a small nation is contrary to our ideals--R. Kennedy.	First--All out air strike Second--Invasion (?) In conflict, knock out all weapons that can be used against you in the future.
Location of ships enforcing quarantine	Bring closer to Cuba to give Khrushchev more time to think.	Maintain beyond the operational radius of interceptors based in Cuba.
Interception tactics	Use as signal of intent and to communicate capability. Stop ships of other than Russian registry first.	A blockade is a blockade. Stop everything that floats. Any ship that gets through is a score against us.
View toward political decision-making organization of adversary.	Maintain central polity intact; hope that military thinkers will not take over.	Political matters are not our concern; ignore polity of adversary.
Perspective of decision-making; overall objectives	Decision-making as multi-stage; avoid escalation, and avoid actions that would tempt adversary to escalate.	Decision-making as single stage; win the battle. Assume adversary will not choose to escalate.

**Note:** The above perspectives exemplify conflicts between military and political value systems. Value sets about military deployments, tactics, have developed during several centuries of fighting, using weapon technology that by present standards is quite unpowerful. Emphasis was ( is ) on aggressive action, practiced discipline, and execution of doctrinaire routines such as fire and maneuver. Attention was concentrated on winning the battle. Guided by these tactics, opposing military units are much like two fighting cocks, each straining for battle. The problem with this perspective in a world of atomic weapons, is that it provides no solution other than "shoot first" to resolution of conflict between two forces, each with the capability of destroying the other within a matter of minutes. Since development of nuclear weapons, only three decades ago, there has been much less opportunity to explore ways by which a major nation such as ours employs military forces in an active way--but not necessarily in a destructive capacity--to avoid incursions against itself and allies while avoiding escalation.

**Simulation criteria.** Simulation may be conducted to develop a better understanding of this critical area. A "talk through" simulation format might be followed. The play could involve conflicts between sides each with access to nuclear weapons. Military and political decision-makers would be simulated. Objectives would be:

1. to spell out branchings of actions and counter-actions that appear probable, and political and military factors that bear on the likelihood that the contest will follow these branchings.
2. to identify specific manifestations of conflicts between military and political values and action guides by decision-makers.
3. To indoctrinate military decision-makers in the political factors that bear on crisis decision-making; in particular, on crisis decision-making as a multi-stage process in which seeking a short term advantage can be inimical to a rational resolution of the problem.

Criteria would measure the extent to which the above purposes had been achieved.

1. A "map" would show probable branchings generated by action and counter-actions by sides in multi-stage decision-making.
2. Conflicts between political and military value systems and action recommendations would be identified and described.
3. Equivalent questions might be asked of participants before and after simulation as an indication of whether simulations had brought about a broader understanding of conflicts between political and military value systems.

Simulations described above assume, in effect, that no OPLAN's exist. In practice, for any given crisis, it is likely that one or more OPLAN's will be available. The work described next involves matching options and OPLAN's as a follow-on to work above.

**Research on feasibility of OPLAN modifications.** Many claim that long range and contingency plans<sup>31</sup> are never relevant to the instant crisis. "You have to start planning from

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<sup>31</sup>Long range planning tends to become institutionalized (as a gesture) and then disregarded. As far back as 1936, war games and drills in the Hawaiian Islands had been planned on the basis of surprise (air) attacks on Pearl Harbor. But organizational routines for defense of Pearl Harbor proceeded without reference to that planning exercise. (Roberta Wohlstetter, *Pearl Harbor: Warning and Decision*. Stanford, California: Stanford University Press, 1962.)

scratch." Nonetheless, it should be possible, during crises to save time by using prior planning without being compelled to follow it to the letter. It might be easier to do this if OPLAN's were conceived as representing specific values on generic parameters descriptive of operational and logistic capabilities. If such a set of parameters were understood in advance, it should be possible to convert a Plan 1 to a Plan 2 or 3 by changing values along common parameters, then tidying up. The need for rapid response in crises makes this area worth exploring.

**Purposes and conduct of simulation.** The purposes of simulation are to evaluate (a) the feasibility, and (b) the value, of developing prescriptive guidance for modification of existing OPLAN's in the event of crisis.

One might provide as follows. Develop a scenario and a political option for use of military forces. Concurrently, develop three OPLAN's, each relevant to the political option, but with the three so constructed as to require increasing amounts of modification. Three groups, each of two or three qualified officers, would be designated as subjects. Each group, working independently, would be given the scenario and one of the OPLAN's. A fourth group would be given the scenario and defined option, but it would have to formulate its own OPLAN's from scratch. Thus:

*Group A* has an OPLAN needing only minor changes.

*Group B* has an OPLAN that needs moderate changes.

*Group C* has an OPLAN that needs major changes.

*Group D* has no OPLAN.

**Criteria.** Criterion measures would consist of:

1.   a.   ability of groups A, B and C to recognize each change needed in given OPLAN's.  
      b.   time required to detect needed changes.
2.   satisfactory modification of OPLAN's for each change needed.
3.   time required by Group D to develop OPLAN; it's completeness, value as compared to OPLAN modifications.
4.   Summary: The probable utility of developing guides and procedures to facilitate modification of OPLAN's.

This approach should provide useful guidance as to: (a) how to detect modifications needed in an OPLAN, and how to make them; and (b) when modifications required become so extensive that it is better to start planning from scratch. Findings should be confirmed by replicating the study using different subjects, and scenarios and option statements.

#### **Section B. Organizational Criteria for Crisis Management**

The various agencies of the U.S. government are organized primarily to conduct the normal day-to-day coordination and management of the government's political, military and economic policies and programs. It is from these agencies that the Crisis Action System and its *organizational structure and arrangements* evolve when a crisis situation develops. The organization/structure of the CAS may be different for each crisis situation; however, any crisis situation is likely to involve some groups which are permanently organized and staffed, skeletal groups that are highly augmented for crisis response and still other groups which are formed and staffed on the spur of the moment. The latter two types of groups in particular often consist of individuals who have not worked together before, who come from different agencies and who may have different professional backgrounds. *Organizational arrangements*, as used in this chapter, refer to the authority structure within and between the groups that make up the CAS for a particular crisis situation and to the information transmission/exchange rules by which the groups perform their crisis related functions. It is quite probable that the CAS's organizational arrangements can and do have a significant effect on its overall performance.

#### **The Purpose for Simulating Various Organizational Arrangements**

Those who plan and guide the evolution of the CAS when a crisis situation develops can establish groups and *impose authority structures and rules* for information transmission/exchange. The objective is to impose those authority structures and rules that will result in the



best CAS performance. Implicit in this objective is the assumption that the CAS is likely to perform certain functions in a particular crisis situation better under some organizational arrangements than under others. Simulation can be used as a tool for those who will plan and guide the evolution of the CAS to determine which organizational arrangements are best for which kinds of functions.

### Organizational Arrangements as Independent Variables

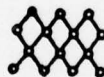
In the simulation of organizational arrangements, the independent variables are forms of organization of individuals *or* groups of individuals. The authority structure and the rules for information transmission/exchange may vary for different forms of organization.<sup>32</sup> Figure 17 depicts how the stations, whether individuals or groups, may be connected in six basic forms of organization. We assume that each form has real life counterparts.

Figure 17.

### BASIC FORMS OF ORGANIZATION



1. Linear



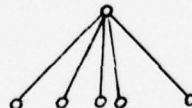
2. Honeycomb



3. Multiconnection



4. Wheel



5. Hierarchical;  
single-echelon



6. Hierarchical;  
multi-echelon

<sup>32</sup>Note: Our thinking throughout this section is much influenced by the publication *Concept, Algorithm, and Decision* by V.V. Druzhinin and D.S. Kontorov. See Chapters IV and VI. Examples of related work in the U.S. include: *Group Dynamics, Research and Theory*, by Dorwin Cartwright and Alvin Zander (Chapter 33, "Communication Patterns in Task-oriented Groups," by Alex Bavelas); *A Social Psychology of Group Processes for Decision-Making*, by Barry E. Collins and Harold Guetzkow; and *Operations Research for Management, Volume II*, by Joseph F. McCloskey and John M. Coppingier, editors. (See Part III, "Information Handling," by L.S. Christie.)

Each of the basic forms of organization depicted in Figure 17 incorporates certain aspects as follows:

1. **Linear.** In the linear form, each station (except for the end stations) is connected to its two adjacent positions. Information passed from one end to the other becomes known to all stations; however if any station fails to relay all the information it receives or if the connection is broken between any two stations, partial or complete failure will occur in the operation since there is no alternate route by which a poorly functioning station can be bypassed or by which detached parts can be connected. This form of organization, which provides for no differentiation in station authority, is easily augmented with no effect on the station connections; i.e., after augmentation each station is still connected only with its two adjacent stations.
2. **Honeycomb.** This form is a highly complex structure with many branched connections through which each station, unless its position is on the periphery of the honeycomb, has a two-way information exchange with four other stations. This redundancy in information exchange insures a high degree of operational reliability and permits poorly performing stations and connection breaks to be by-passed. There may or may not be differentiation in authority assigned to stations. This form can be augmented only by adding stations on the periphery of the honeycomb.
3. **Multiconnection.** This form has several physical equivalents. One involves open channels between physically separate individuals or groups. Another is a face-to-face conference; still another is a teleconference. There may be no differentiation between stations in authority, or stations may be assigned specific authority. The multiconnection form affords maximum reliability and information exchange speed since there is never a need for alternate connection branches. Since each station is connected to all others, it may well be the best organizational structure for brainstorming and evolving creative solutions. This form of organization is not easily augmented as the network of connection branches becomes extremely complex as the number of stations is increased. For example, in a four station organization of this form, there are six connection branches; in a six station organization, there are fifteen connection branches.

4. **Wheel.** This form of organization is a hybrid that incorporates certain aspects of both the circle and multiconnection forms. There is generally no differentiation in authority for the stations occupying the periphery of the wheel; however, the station occupying the hub of the wheel maintains control and authority over all other stations. Any two stations in the periphery of the wheel have a two-way information exchange and there is a two-way information exchange between all stations in the periphery and the station occupying the hub. This form, which affords a high degree of reliability because of redundancy in connection branches and good information exchange speed, can be easily augmented.
5. **Single-echelon hierarchical.** The single echelon hierarchical form involves distinct differentiation in authority for a single station which serves as the focus of the structure. There is a two-way information exchange between the focal station and other stations in the structure; however, there are no direct connection branches between the other stations. There are no alternate connection branches between the focal station and other stations in the structure to compensate for a poorly performing station or a break in connections. The structure can be readily augmented up to the point where it is no longer possible for the focal station to maintain control. When this condition is approached, the single echelon hierarchical structure tends to evolve into a multi-echelon structure which will be discussed next.
6. **Multi-echelon hierarchical.** This is the basic structural form for practically all sizable going concerns. Station authority is differentiated by its level of command. Two-way communications links between levels of command are SOP; lateral communications between stations of the same rank may be established as well. The multi-echelon hierarchical structure can be readily augmented by a) adding stations at any command level to the limits of span of control, b) adding yet another echelon, or c) augmenting leader positions using staff assistants. Operational effectiveness of such structures are highly dependent on leader capabilities. Further, the time demands of crisis situations sharply limit the effective buildup of echelons.

#### **Criterion Measures as Dependent Variables**

When evaluating or assessing alternate forms of organization, two types of criterion measures must be applied. One type involves the desirable (or undesirable) attributes or characteristics that are intrinsic to each particular form of organization structure. The other type measures effectiveness of *system action processes*. Examples of each type are discussed below. The assumption is that different organizational structures differentially help/hinder different problem solving system action processes.

**Criteria relevant to the attributes that are intrinsic to a form of organization.**

1. **Will the form of organization readily accept augmentation?** It is desirable to have CAS organization structures in which the number of stations in the structure and the personnel within stations can be quickly and easily increased consistent with the demands placed on the CAS by a particular crisis.
2. **Will the form of organization compensate for weaknesses, i.e., poorly performing stations and/or breaks in station connections?** As described in the previous section some forms of organization incorporate redundancy in station connections which to some extent may compensate for poor station performance or breaks in station connections.
3. **Does the form of organization remain stable or does a new structure evolve as the tempo of the crisis situation increases?** Marked organizational structure transformations that occur *during* an ongoing crisis situation represent a critical time drain that can result in errors in as much as managers and system action process operators must become accustomed to a new structure and organizational arrangements. Honeycomb and other very complex multi-connected structures are especially susceptible to transformation into hierarchical structures.
4. **Does the form of organization have sufficient versatility to adjust to the functional demands of various crisis situations?** The functional demands placed on the various stations in the organization structure may be quite different for different crisis situations. Such functional demands may include providing information, making decisions, or taking action.
5. **Is the form of organization cost-effective in its use of personnel?** Structures that permit checks on solutions are apt to err less frequently. But redundancies in task allocations that increase reliability of performance are not without costs. The manager's problem is to find the most cost-effective allocation of resources from among those that can be made available.

**Criteria Relevant to the Effect that the Form of Organization has on System Action and Managerial Processes**

1. **Does the form of organization have a propensity for error-free transmission and exchange of information?** Organizational forms such as the linear structure are more prone to err, for the overall error-free performance of the structure depends upon error-free performance of each station in the structure.



2. **Does the form of organization permit the rapid reliable transmission and exchange of information?** The structure's overall speed and reliability of information transmission and exchange is enhanced by multi-connected stations in the structure and by two-way information exchange.
3. **Does the form of organization permit managerial and key personnel to devote their attention to the problem at hand?** Some organization structures such as the honeycomb can become so complex that managerial and key personnel must concentrate their attention on *maintaining the structure*, rather than on the functions that are being performed by the structure.
4. **Is the form of organization conducive to innovative problem solving?** The need for innovative problem solving at the NCA, JCS and unified and specified command levels is evident from material presented in Chapter III. There are indications that the multi-connection structure can best serve this purpose.

### **Summary**

The CAS's organizational structure and arrangements very likely have a significant effect on its overall performance. Simulation can be used as a tool by those who plan and guide the evolution of the CAS when a crisis situation develops to determine which organizational arrangements are best for which functions. Two types of criterion measures can be used for assessing alternate forms of organization. One type is relevant to the attributes that are intrinsic to a form of organization; the other type is relevant to the effect that the form of organization has on system action and managerial processes. Nine specific criteria were listed as examples in the preceding discussion. Finally, there are indications that the best structural relationships are in some degree dependent on the scope and nature of the problems to be solved.

### **Section C. Information Processing Criteria**

In Chapter III, it was noted that four information processing tasks occur and reoccur through the operation cycle of the Crisis Action System. The four tasks are:

1. Information sensing/acceptance.
2. Information assessment/synthesis.
3. Information interpretation/diagnosis/decision-making.
4. Preparation and transmission of reports and messages.

These tasks may be performed by an individual, by a group, or by several groups working in unison. However performed, the first task merges into the second and the second into the third, so that the first three tasks may not be perceived as discrete. These intellectual data processing steps may be examined by simulation.

### **Purpose of Simulating Information Processing**

It may well be that human and machine information processing related to decision-making exhibits similar characteristics, even as the substantive content of the information varies markedly. A better understanding of both the capabilities of man and various man-machine combinations should provide guidance for the augmentations and redesign of future C<sup>3</sup> systems. It should be possible via simulations to quantify relationships between core sets of independent and dependent variables—relationships which can be applied with some promise of validity to human and man-machine information processing tasks in the many cells and nexuses of the CAS.

### **Criterion Measures as Dependent Variables**

Criterion measures are applied to measure the effectiveness with which information processing tasks and sub-tasks described earlier are performed. Examples of specific criterion measures are:

<b>Information Processing Tasks</b>	<b>System Action Processes</b>	<b>Criteria</b>
1. Information sensing/acceptance	Ascertaining: <ul style="list-style-type: none"> <li>● source reliability</li> <li>● validity</li> <li>● completeness</li> <li>● accuracy</li> </ul>	<ol style="list-style-type: none"> <li>1. Was or is the information source reliable?</li> <li>2. Was the information verified from other sources?</li> <li>3. Were all relevant known facts reported?</li> <li>4. Was the reported information accurate?</li> <li>5. Were there unexplained conflicts in the reported information?</li> </ol>

(Cont'd.)

Information Processing Tasks	System Action Processes	Criteria
2. Information assessment/synthesis	Information: <ul style="list-style-type: none"> <li>● extraction</li> <li>● reduction</li> <li>● integration</li> </ul>	<ol style="list-style-type: none"> <li>1. Were relevant bits of information recognized and extracted?</li> <li>2. Were information redundancies noted and eliminated?</li> <li>3. Were apparent conflicts in the information noted and explained?</li> <li>4. Were key relationships among incoming information bits recognized?</li> <li>5. Were information items ordered in such a way as to permit easy integration?</li> <li>6. Were estimates of information relevance modified when required as new information was received?</li> <li>7. Were the needs for additional information correctly recognized?</li> <li>8. Were requests for additional information clearly formulated?</li> </ol>
3. Information interpretation/ diagnosis/decision-making	Subjective: <ul style="list-style-type: none"> <li>● interpretation</li> <li>● diagnosis</li> <li>● decision-making</li> </ul>	<ol style="list-style-type: none"> <li>1. Were explicit hypotheses stated as to alternative ensuing states of affairs that might exist?</li> <li>2. Was all relevant information bearing on these hypotheses considered, taking into account: <ol style="list-style-type: none"> <li>a. different reliability of sources?</li> <li>b. stored information?</li> </ol> </li> <li>3. Was the probability of each of the hypothesized ensuing states of affairs estimated?</li> <li>4. Were alternate options or courses of response actions considered for the most probable ensuing states of affairs?</li> <li>5. Were criteria established for the evaluation of alternate response options?</li> <li>6. Were the criteria weighted for importance?</li> <li>7. Was the response option selected consistent with the information regarding the state of affairs?</li> </ol>
4. Preparation and transmission of reports and messages.	Message or report <ul style="list-style-type: none"> <li>● content</li> <li>● priority</li> <li>● designator</li> <li>● classification</li> <li>● method of transmission</li> </ul>	<ol style="list-style-type: none"> <li>1. Was the report/message clear?</li> <li>2. Did the information reported accurately describe the situation or event?</li> <li>3. Was the report/message given the correct <ol style="list-style-type: none"> <li>a. priority?</li> <li>b. designator?</li> <li>c. classification?</li> </ol> </li> <li>4. Was the report/message addressed to the proper recipients?</li> <li>5. Was the most appropriate method used to transmit or relay the report/message?</li> </ol>

## Summary

Four primary information processing tasks occur and reoccur throughout the operation cycle of the CAS. These four recurring tasks drive or dictate certain *system action processes* that are treated as independent variables in CAS information processing simulation. The criteria are the dependent variables that are used to assess or evaluate the system action processes. Twenty-five specific criteria were listed as examples.

## Section D. Criteria Pertaining to Man-Machine Interactions

This section is concerned with types of *machine process aids* that are used or could be used to enhance the performance of the *system action process operators*. The term machine process aids, as used here, includes but is not limited to, various types of communication hardware, computers, data display devices, etc. Those types of process aids are discussed:

- teleconferencing
- man-computer forecasting
- computer assistance in inductive reasoning.

Process aid simulation experiments may be used to: (a) evaluate the value of process aids; and (b) to develop managerial procedures for integrating the process aid into the *system action process*. If two or more process aids that perform the same functions are being considered, simulation can be used to determine which aid is the best.

## Teleconferencing

See Chapter IV, "Putting It All Together," page 47. The performance of the Crisis Action System is heavily dependent upon the efficient and effective transmission and exchange of information between individuals, sub-elements and elements of the CAS. Here, teleconferencing has great potential.



**Communication networks for teleconferencing.** Communications hardware is available and in many cases emplaced, which permits physically separate groups to communicate effectively. Equipment may consist of facsimile only, audio plus facsimile, or audio plus television monitors. There remain certain problems. These may include: human problems— for example, misunderstandings as to responsibilities, loci of authority; technical problems, some introduced by time delays in secure satellite relays, **and** problems of efficient switching to bring all conferees quickly on line. Any or all of these may be examined in simulations. <sup>33</sup>

The response time demands imposed by crises place an additional premium on rapid and error-free information processing by groups; however, customs of scheduling meetings for day-to-day operations often carry over in times of crisis. Thus, an hour or so delay may be required in scheduling various meetings to allow attendees to wend their way through urban traffic so all can be physically present. Under such conditions, teleconference equipment has many potential advantages. Secondary reports seem to indicate that teleconferencing has not been fully exploited. Among its potential uses are the following:

1. **Situation diagnosis.** Of many potential applications, consider the use of intelligence in situation diagnoses. Several agencies will be correlating information from their different sources. "Facts" reported to and from these different sources may differ. Secure teleconference arrangements between agencies could permit conferees at separate terminals to compare their accounts, to sort out what is true, what is redundant, and to resolve differences. These activities carry over into interpretation of factual evidence which often will require interrogation of data banks. In preparing these banks, agencies may tag information differently; summaries of information classified under the same tag may differ because agencies—consistent with their different missions—may use different classification systems. Some agencies will have more detailed and up-to-date information on certain issues than will others. It would be most difficult to sort out what appear to be conflicting "facts" and interpretations at the WSAG level, for these executives can hardly be expected to know how data were collected and classified by different agencies. Teleconferencing among intelligence agencies should improve the quality/validity of information provided to WSAG and to the NCA.

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<sup>33</sup>M. Dean Havron. "Obstacles to the Acceptance of Teleconference Systems." Paper presented at the 18th International Congress of Applied Psychology, 30 July 1974, Montreal, Canada.

2. **Informing bypassed elements.** During the Cuban quarantine, and in several crises that have occurred since, the President and/or the Secretary of Defense have communicated directly with commands of elements on the crisis scene. Many DOD officials, quite naturally look askance at this practice, but as communication equipment proliferates, it will likely continue. The point is that during these communications from the NCA directly to the crisis scene decisions may well be made that relate to the support role that intermediate agencies need to play and their specific tasking. Decisions may be made, in effect, that make certain ongoing planning tasks of bypassed commands moot. Both the words spoken and feeling tone—between Secretary of Defense and a ship captain—may suggest new directions for activities of support elements. Teleconferencing with intermediate elements at terminals on line listening in should help to keep intermediate elements up to date and permit them to better anticipate probable future demands on their resources.
3. **Coordination of policy, resource, and operational planning.** Belden has suggested<sup>34</sup> use of teleconferencing to establish networks that would concurrently develop policy, plan operations, establish resource requirements and plans for providing resources. It follows that a superordinate net would be needed to coordinate activities of terminals responsible for policy, operations, and resources.

**Criteria for teleconferencing research:** experimental simulation of system types, number of terminals on line. Two examples of simulation follow. First, questions arise as to whether audio-video facilities (much more costly and more difficult to maintain) are sufficiently superior to audio plus facsimile to warrant establishment of audio-video facilities. The main justification for audio-video as compared with audio plus facsimile is that its four megahertz bandwidth permits instant transmission of alphanumeric and displays for common viewing at connected terminals. Also, most people prefer audio-video facilities.

To make this determination, those who would confer with working groups could be provided crisis scenarios via both audio plus facsimile and audio-video facilities. Results of conferences could then be measured in terms of criteria such as:

1. Was relevant information available at each terminal considered and evaluated?

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<sup>34</sup>T.G. Belden, *Crisis Conferencing and the Pueblo Case*. Arlington, Virginia: Institute for Defense Analyses, February 1970.

2. How much time was required to resolve all issues on the agenda?
3. What was the quality of decisions reached?

A second important issue involves determination of the approximate number of terminals that can be interconnected for free interchange of ideas required in *problem solving* conferences, and best procedures for coordination. (The number of terminals on line should not be limited if the conference purpose is to provide information or give orders.) Criteria noted above should be relevant to these determinations.

**Criteria for availability, operational use of teleconference equipment.** Several criteria appropriate to operational use of existing facilities can be formulated and applied by inspection.

1. Are teleconference terminals established between core users: policy, intelligence, operations, resources?
2. Are policy guides for interconnecting user groups established and understood by these groups?
3. Are procedures established, understood, and practiced which permit rapid interconnections between terminals and efficient conferencing?

**Summary.** Teleconferencing, together with EDP equipment, stands to help crisis planning and coordination between decision centers and between such centers and field commanders. Equipment is available and has been used substantially. Questions as to the value of audio-video facilities, and the number of stations that can usefully confer can be answered by experimental methods.

#### **Information Processing and Decision Aids**

A number of computer-display alignments might be incorporated in crisis management systems to assist operators in data processing. Applications, tasks and criteria are described below. The present state-of-the-art can support most of these.



**Assistance in forecasting: the problem, tasks.** Most crisis decisions involve forecasts. It will often be critical to sense where a given trend of events is leading us so as to help identify and prepare for future decisions and actions. The tasks involve taking historical data—usually short term trends—and projecting them to stated times in the future. Applicable steps in the crisis management cycle include problem recognition, testing tentative solutions against time/space factors during operational planning, and situation monitoring.

Forecasting aids are currently available and being used in DOD and commercially. There are, however, practical problems in their use in crisis decision-making.

1. There is the problem of anticipating which core groups or individuals in particular agencies would use such devices, what information they would require, and whether this information is generic or crisis-specific.
2. One, or a set of algorithms, must be available such that operators can select those needed for particular applications.
3. There must be a means of providing available data for estimates to computational facilities rapidly.

Scenarios can be constructed which provide the kinds of information which specific decision aids would process.

### Criteria

The following criteria are suggested:

1. Have core user groups been identified? Have appropriate algorithms been provided? Do operators understand the constraints on algorithms, and how to select those needed?
2. Algorithm characteristics:
  - a. Do algorithms permit concurrent projection/display of several variables by linear projections and rate changes?
  - b. Do algorithms permit bounding of areas of uncertainty based on estimated reliability of the data?
  - c. Do algorithms permit display of results of trends at selected future times?



3. Are there means and procedures for identifying data needed and inputting them into the computer to be used? Can the computer accept both data *descriptive of external events* and estimates (of external events) by operators?
4. Is the program so constructed that operators can input new data into the computer that would modify computational equations?

### Assistance in Inductive Reasoning

In the first three steps of the recurring information processing cycle—sensing/acceptance; integration, decision-making—there is a frequent need for inductive reasoning. A frequent requirement is to match bits and pieces of incoming information against two or more hypotheses as to what real world state exists; or, what action options or alternatives are possible, or most feasible.

The essential tasks are to accept incoming items of information, define alternative hypotheses or states, and to determine the probability that a given alternative state exists. The role of an algorithm here would be to unburden operators or groups so that they would not have to sum up and store in memory new information about events and subjective probabilities.

The Bayesean approach exemplifies the sort of algorithm needed; however, certain problems must be resolved in its use.<sup>35</sup>

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<sup>35</sup> Among these are the following:

- a. It is assumed that information items are independent. This may not be true, or perhaps more annoying, it may not be possible to determine whether two information items are independent.
- b. It assumes all possible states or hypotheses have been identified at the outset; if, during the assimilation of information, a new state/hypothesis emerges, we must add the assumed new state and recompute probabilities previously assigned.
- c. Unless allowances or adjustments are made, as more and more inputs are accepted, the computations become increasingly stable, hence increasingly insensitive to the influence of the next information item.

There are ways of solving or avoiding these problems. They may be situation specific. In any case, they require competence and understanding on the part of operators.

**Operational criteria.** Criteria are similar to those indicated for computer assistance in forecasting displays.

1. **The group of groups** in agencies that would consistently perform these inductive tasks must be identified. Can this be done?
2. Can types of information these groups need be identified with sufficient specificity? Can arrangements be made to input this information to the operator and for him to insert it in decision aids?
3. Can operators capable of using this decision aid be found and retained?

**Value/feasibility of decision aids.** Practically all decision aids we have referred to are within the state-of-the-art and technically feasible. The very real managerial problem is that procedures, space arrangements, data banks, etc., are configured for day-to-day operations. Fortunately, we have few crises. A year or so can go by without a set of events occurring that would be so labeled. If equipment and devices suggested, and proficiency in their use, is only to be called for in crises, there will be some natural reluctance on the part of managers—confronted with problems and requirements typical of so-called routine operations—to have equipment clutter up space, and to maintain trained operators. This is compounded by the fact that the specific aids, algorithms, and trained operators needed may not well fit the computational problems presented by the next crisis. Much work has been conducted in this area as reflected in the bibliography. Most presume error-free identification of generic variables, and precision in problem formulation that are not likely to be found in the pressure-cooker environment characteristic of crisis decision-making.

### Summary

Development of a complete set of criteria that could be applied to all of the activities that crises (hence crisis scenarios) can set into motion far exceeds the scope of this project. Four criterion perspectives, each relevant to the performance of the elements and sub-elements of the CAS, have been developed:

- Systemic or whole system criteria.
- System configuration or organizational criteria.
- Information processing criteria.
- Man-machine interaction criteria.

Examples have been constructed to illustrate how scenarios could be generated and criteria developed for each of these perspectives. Finally, the perspectives often imply different simulation approaches which can vary from operations research/systems analysis through experimental studies to "talk-through" inspections.

This chapter is concerned primarily with derivation of criteria; however, it should be noted that the appropriateness of specific criteria, the level of detail in which they are articulated, criterion weights, and the way in which criterion scores are combined are first dependent on the purpose of the simulation. They are further dependent on the way in which this purpose is translated into particular scenarios, on the independent variables that are to be evaluated, and on the specific tasks the scenario requires participants in the simulation to perform. In sum, criteria represent one critical piece of a jigsaw puzzle that contains several equally critical pieces. Together, all must form an harmonious whole such that criterion data obtained are fully responsive to the purpose of the simulation.

## **Chapter VII**

### **RECOMMENDATIONS: A PROGRAMMATIC APPROACH TO SIMULATION**

This chapter consists of two sections. The first sets forth a broad plan for implementing simulations such as those described in Chapter VI. The second suggests guides for planning simulations in groups or clusters. One central strategy or theme applies equally to both: as with chess masters, each move should be planned so as to have multiple significance.

#### **Implementing Individual Simulations**

Working from Chapter III material we deduced, and described in Chapter VI, examples of simulations under each criterion perspective. A panel should be convened to review these and other possible simulations, and to select one or more for implementation.

#### **General Goals**

Considerations—possible directions—that might be reviewed by the panel are as follows:

1. Strive for off-line simulations that produce valid results. Whatever specific simulations are planned, it would be desirable to acquire data which would permit us to determine whether, to what extent, and under what conditions information obtained from off-line simulations can apply to on-line operations of components of the crisis action system. The essential validity of data obtained off-line needs to be verified.
2. Keep in mind cost-effectiveness. Costs of simulations increase markedly with the number of subjects utilized. It should be possible to provide information of value by small scale simulations.



3. **Develop indices of group information processing.** In keeping with the strategy of maximizing information yield, several purposes can be pursued concurrently within any single simulation. One such purpose is to identify generic parameters descriptive of human information tasks, and to use simulations to demonstrate the utility of the parameters. This appears feasible by nesting specific simulations such as those suggested in Chapter VI within a broader purpose of developing parameters which would have general applications to other simulations, and to sub-tasks performed by CAS elements.

As an example, four information processing steps which occur again and again throughout the CAS operations cycle were identified in Chapter III, and criteria for their measurement were suggested in Chapter VI (pages 85-86). It should be possible to define the parameters underlying these criteria, to apply them to collection of performance data on information processing tasks, and from these data to generate stochastic distributions descriptive of performance along established parameters. Such distributions could then be related to factors such as task load, the substantive nature of the information processed, rules used for information processing, etc., etc. Such indices, if they can be derived, provide a basis for forecasting human information processing performance. If such forecasts could be verified, the indices on which they are based would permit rapid/repeated computer simulations of human decision-making. Implications for design of systems, and **development of guides** for human information processing on man-machine integration are many.

By extension, this approach could be applied to simulation of inter-node or inter-group information processing, as described in pages 79-84. Here, the influence of structural variables such as different interconnections, and rules for inter-group transmission of information could be examined.

The thrust of all of the above suggestions--whatever substantive problems are attacked--is to develop guides that will permit the findings to be generalized across simulations and to the CAS.

### **Coordination with Expert Panel; Conduct of Simulation**

As indicated above, a panel of managers experienced in operations of the CAS should be selected to assist in planning of simulations. Panelists should be asked first to review this report, especially Chapter VI. Candidates for agenda items are:

1. Discuss general guides and direction.
2. Identify areas as candidates for simulation. These include all simulations described in Chapter VI, plus others that panel members may suggest. Select one or two candidates for implementation.
3. Identify managers especially familiar with the operation in question, constraints, limitations, etc.
4. Review and reformulate as indicated, key problem areas, causal factors to be studied, criteria, etc.

Based on this meeting with the panel, a detailed plan for one or two simulations would be developed by researchers and reviewed by panel members. The simulation would be conducted and data would be analyzed and reported. Further simulations could then serve to compare performance on similar tasks off-line and on-line.

### **Planning Simulations in Groups or Clusters**

This section takes a programmatic view; it pertains to planning of simulations, not individually, but in groups or clusters so as to maximize information yield. Discussed in turn are: the need for a crisis typology, planning simulations in sets and comparing information on human information processing across simulations.

### **Establish and Use a Crisis Typology in Simulations**

Some claim that crises cannot be classified, that each is unique. Surely, each crisis has its unique elements, and attempts to classify crises have not been very successful. Still, on methodological grounds, it is most undesirable to regard crises as unique. This leaves us nowhere to go, for each unique case needs special treatment. Historical accounts can provide a test of sorts. If all crises are unique, descriptors of past crises should look like a distribution of random numbers drawn from a bank of random numbers. By contrast, past cases appear to fall into certain quasi-classes:<sup>36</sup>

1. **Attack on an ally:** The North Korean Invasion of South Korea; NVA attacks on South Vietnam; the bombardment of Quemoy Matsu by Communist China.
2. **Evacuation of American nationals:** Dominican Republic, 1965; Saigon, 1974; and Lebanon, 1976.
3. **Interposition of forces to deny access:** The Berlin Blockade and the Cuban Quarantine are, in some senses, mirror images.
4. **Seizure of a U.S. ship:** Of many ship seizures, two have precipitated international crises (seizure of the Pueblo and the Mayaguez).
5. **Third country conflicts:** The Israelis and the Arabs; England, France, and Israel versus Egypt over the Suez Canal in 1956.

Similarities between defining characteristics of prior crises are far greater than one would expect to find in successive draws from a bank of random numbers.

It is reasonable to assume that there is some system in crises—that there must be common parameters. This assumption, once verified, would provide a basis for classification. Such classification is especially significant if, as some claim, the nature of the crisis drives the crisis action system. Crises may be said to drive the system in that:

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<sup>36</sup>Richard Smith Beal, "Monitoring International Crises," and other similar reports. This was a report sponsored by the Organizational Effectiveness Research Programs, Office of Naval Research (Code 452), under ARPA Contract No. 2518. N00014-67-A-0269; NR 177-952. January 1975.

- the geographic location determines what CINC's become the supported command.
- the character of the threat determines which U.S. objectives and national interests are apt to be involved.
- U.S. objectives, geography, and force types and availability influence decisions as to what U.S. forces are employed, and in what missions.
- the nature of these decisions determines information requirements, and guides for its processing and integration.
- crisis types influence available response times.

The above are best considered as hypotheses to be evaluated, not factual claims. If these hypotheses can be supported, it would follow that crises can meaningfully be assigned to classes. Further, since crises help shape the response of the CAS, such assignment would provide a systematic (if incomplete) means for classifying decisions and information **processing** requirements by crisis class. Organization of information about crisis management in this way should substantially assist in designing Crisis Action Systems and procedures. Verification of the above hypotheses would provide substantial methodological leverage; if they cannot be shown plausible, we are no worse off than we would be if we accepted the assumption that each crisis is unique.

#### **Plan Simulations as Sets of Studies**

The need to classify crises illustrates one element in a broader strategy of planning simulation exercises. The objective, always, is to maximize information yield, i.e., the amount of information we purchase from a given simulation effort. The objective applies to the planning of individual exercises or experiments. Because crisis management systems are most complex, because specific system configurations must be tailored to some extent to the crisis of the moment, and because no single exercise can purchase nearly all the information needed, it applies with even greater force to the need for a strategy which can guide the organization of individual simulations.



This central point can be illustrated as follows: we wish to study A, B, and C. A, B and C may be three crises, they may be alternative subsystems of a  $C^3$  system, they may be three management procedures, or algorithms programmed into a computer. To oversimplify, each study buys a unit of information; when studies of A, B and C are completed, the study effort has purchased three units of information. The challenge for research strategy is to plan studies A, B and C so that results can be meaningfully compared. If this can be achieved, three more units of information become available: A compared with B; A with C; and B with C. Thus, the information yield is greatly increased, for little extra effort. The procedure is usual in experimental approaches where trials can readily be replicated. It is more difficult to apply in system studies where a very limited number of simulations can be run.

The objective in planning is to establish conceptual links among individual studies and to implement these in simulations. These links may consist of specifiable relationships between scenarios, between causative factors treated as independent variables, and/or between criteria. Types of links between studies should be visualized in advance. Hypotheses should be established *before the first simulation set is performed* as to the relationships to be expected among the several studies of a set. For example, an application might consist of examination of similarities/differences between decisions and information requirements as between crisis types. Hypotheses would be established such that the types of decisions and information required *will be similar* within crises involving (a) evacuation of American nationals, and (b) a ship seizure respectively, and *different* between these types of crises. Historical studies and/or simulations may be used to examine these hypotheses.

Almost everyone concerned with system development will grant the advantages of planning simulations in sets. Implementation requires a very careful development of a data bank, with parameters that include a description of the relevant aspects of each simulation, thoughtful coding of scenarios, tasks to be performed, and criterion measures. Thus, results of successive studies can be compared; they leave a recorded history. Such documentation

should also be useful in indoctrination of personnel new to the system in its operations. This has not always been done as well as it might be in many system development efforts.<sup>37</sup>

### **Exploring Utility of Information on Human Information Processing Capabilities**

Effective crisis management systems involve the melding of man and hardware capabilities to satisfy the performance requirements of the CAS and its sub-systems. Hardware requirements can be described and specified in terms such as bit rate, bandwidth, computer storage capacity, etc. No similar basis for specifications exists for those who manage and operate C<sup>3</sup> systems. The need for measures of individual and group information processing abilities was cited earlier as one objective of individual simulations. The focus here is on the extent to which common descriptors can be or are relevant across simulations. In practically all instances, data on human information processing will take the form of stochastic distributions. The complexity of the CAS is such that many design and retrofit decisions must be based almost entirely on *expert judgment*. More often than not, the experts who make these decisions are likely to be unfamiliar with the state-of-the-art description of relevant human capabilities. Research should determine what answers can be provided as predictors of human performance and capabilities when information processing systems are involved.

### **Summary**

Crisis operations can be most complex. Currently, elements of the NMCC are being redesigned and operating procedures will undoubtedly be revised as well. The inherent complexity of the system and the many variables its operation introduces make it difficult to make sure that any suggested redesign or retrofit will consistently improve man-machine performance across the spectrum of possible crises. Simulation provides a systematic means of examining the performance of system elements in response to *crisis driven* types of tasks. With the guidance of

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<sup>37</sup> As one example, some years ago, the senior author participated in studies of the function and station design for commanders of Nautilus submarines. As new models of these submarines were produced, a number of changes were made in station configuration. Some were obviously substantial, and had entailed significant costs. With Navy and builder cooperation, we tried to determine why these changes were made; whether any performance data were collected either prior to or after changes to indicate that command would be/was made more effective, and whether they unburdened the skipper. Our findings were quite sparse.

a cognizant panel, it seems feasible to design individual simulations to examine critical CAS functions and elements. Initial simulations would be run off-line, with the objective being the application of results to previously identified on-line segments of the system to which the simulations relate. Such simulations also provide an opportunity to collect data on human information processing capabilities for use in future CAS design studies and in computer simulations of managers performing information processing tasks.

The complexity of the CAS means that the information yield from any single simulation is quite limited to full information needs. A strategy is needed for planning simulations to maximize information yield. A programmatic approach would establish simulations in clusters so that data from all simulations of the cluster can be meaningfully compared.

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